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CONCENTRATED VERSUS DISTRIBUTED PRACTICE.

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In this JOURNAL, Vol. IV, pp. 156-158, I reported an experiment on the relative value of concentrated practice. The practice consisted in learning new symbols to take the place of the twenty-six letters of the alphabet, and in acquiring skill in the use of this new symbol-alphabet. The method was to practice a half-hour, then rest a half-hour, and so continue to alternate practice and rest throughout the day. Practice, however, was not continued for a longer period than one day, fourteen half-hours. It was found that after three or four periods of practice, there was little improvement resulting from the remaining practices of the day. Nor was the permanent effect for the person that worked all day any better than for the person that worked for four practice periods only and then ceased practice.

In those experiments, the characters were very quickly learned, and they were easy to make. Increase in the speed of writing in the symbol-alphabet stopped after a few practices because of the slowness with which the new characters came to mind, not because they were not known nor because they were difficult to make. It was evident that *time* was an important and necessary element in improvement. After a certain amount of practice, it seems that time must elapse before practice is beneficial.

In the spring of 1913, Mr. F. G. Roth conducted in my laboratory some typewriting experiments, the results of which showed that acquiring skill in typewriting was not the same

as acquiring skill in writing with the symbol-alphabet, and that what is true with one kind of learning may not be true with another. I therefore took the first opportunity of making a thorough test of the matter. In particular, I wished to extend practice for a much longer period than one day. The opportunity came in the Summer Session of the University of Missouri, 1913.*

Method of the Experiment.

The particular object of the experiment reported in this paper was to compare the value of practicing five hours a day, in learning to run a typewriter, with practicing one hour a day. Ten subjects took part in the experiment, nine women and one man. They were, for the most part, seniors and graduates in the School of Education.

Five of these subjects worked for ten half-hour periods a day, with half-hour rests between practices. This group will be designated as the *Fast* group. It worked for nine successive days, omitting practice on Sunday, putting in a total of ninety half-hours of practice, forty-five hours. The subjects in this group did nothing else for the nine days; the rest periods were spent in doing as near nothing as was possible.

Five subjects worked for two half-hour periods a day, one in the morning at eight or nine, the other in the afternoon at two or three. This group will be designated the *Slow* group. This group worked for a period of forty-five days, resting on Sunday and occasionally on Saturday, putting in a total of forty-five hours of practice, the same as did the *Fast* group. Care was taken to keep the subjects in as good health and as good condition as was possible. Before beginning practice, each time, the subjects recorded in a note book, their physical and mental condition, and after practice they recorded their introspections bearing upon the practice. They recorded such facts as whether they seemed to have done well or poorly, how the learning seemed to go on, whether there were dis-

*The students who took part in the experiment were, *Fast* group: Misses Mary Flood, Frances Smith, Mabel Schleef, Margaret Mumford and Nell King. *Slow* group: Misses Aretta Watts, Margaret Carney, Pansy Higbee, Susan Tillery, and Mr. E. T. Kelley.

tractions of any kind, and whether anything seemed to hinder the progress of learning. The subjects all worked in the same room, each at a separate table, and each used the same machine throughout the experiment. The time was kept by means of a clock with electrical connections. A bell was automatically rung by the clock every half-hour. The subjects were required to be ready a few minutes before the time for the ringing of the half-hour bell. They waited in an adjoining room, and when the bell rang, immediately took their places at the machines. Four in each group used number five Underwood machines, and one in each group used an Oliver machine.

Although the time was kept automatically, an attendant was always at hand to see that everything went on properly. If a typewriter got temporarily out of order, the subject running the machine quietly left the room and reported to the attendant who noted the time and then looked after the machine. If the time thus lost was small, it was merely considered in computing the speed for that practice; if the time lost was considerable, it was made up by the subject. Every conceivable detail that could possibly affect the learning was taken into account, and careful records were kept of everything of importance to the experiment.

As material for transcribing on the typewriter, the subjects used reprints of the writers *Experimental Study of Expectation*. The reprint was divided up into segments, and at each practice the subjects began at the same place. All subjects, therefore, wrote the same words at the same practice, up to the point reached by the slowest subject. This plan made it possible to determine speed by merely counting the words, and made it unnecessary, at least for our purposes, to count the number of letters and characters written.

The following rules were determined upon and were followed by the subjects as nearly as possible:

1. There must be absolutely no practice outside of this room, or at any other time than the time set.

2. Do your best. Be as accurate as possible, and write as fast as you can.

3. When you see you have made a mistake, do not stop to correct it, go on.

4. All errors will be counted, including spelling, capitalization, punctuation and spacing.

5. Use all the fingers of both hands. Let the first finger take care of one tier of keys; the second finger, take care of the second tier of keys, and so on.

6. Never be late for practice. Come to room 63 (This room adjoined the practice room) two or three minutes before time to start work, and enter in your note book, a record of your mental and physical condition. When the electric bell sounds, go at once to your machine and begin to copy from the place indicated for that practice. Work patiently till the bell announces the end of that period, then leave your machine immediately and give your work to the attendant.

7. Before leaving, write up your introspections as fully as possible.

The Ability of the Subjects.

In an experiment of this kind, in which one wishes to compare the value of two different methods, one should, if possible, either use groups so large that equal ability of the two groups could be assumed, or measure the ability for the kind of work required in the practice. Our groups were not large enough for us to assume equal learning capacity; nor was it possible to carry out a check experiment for the purpose of determining the learning capacity of the two groups. For if we had used one kind of keyboard for the check experiment and another for the experiment proper, the factor of inhibition would have entered, and in groups as small as ours, would have made it impossible to draw any safe inference as to ability.

I therefore decided to rely upon the relative progress of the two groups rather than upon absolute attainments, upon a comparison of the learning of the first few practices, before the effects of method could be very considerable; upon the results of a preliminary experiment in writing figures (digits) with the typewriter, and further upon a test of muscular speed. The test of muscular speed was made by means of a tapping apparatus and kymograph. Both hands were tested. Relying upon these criteria, I found the *Slow* group a little supe-

rior to the *Fast* group. The *Slow* group was 3% faster at tapping; 6% faster at writing digits with the typewriter, and in the first few periods, the *Slow* group seemed to show greater learning capacity.

Although this study is somewhat imperfect and inconclusive, in as much as we are not able to say what the two groups of subjects would have accomplished if they had used the same method, it does show nevertheless, what a small group of university students, evidently of very nearly the same learning capacity, is able to accomplish by forty-five hours of concentrated practice, as compared with another group of fairly equal attainments and ability, with distributed practice. If the disadvantage of concentrated practice in learning typewriting were very great, the difference in achievement between our *Slow* group and *Fast* group would have been much greater than it turned out to be and would have grown greater as the experiment progressed.

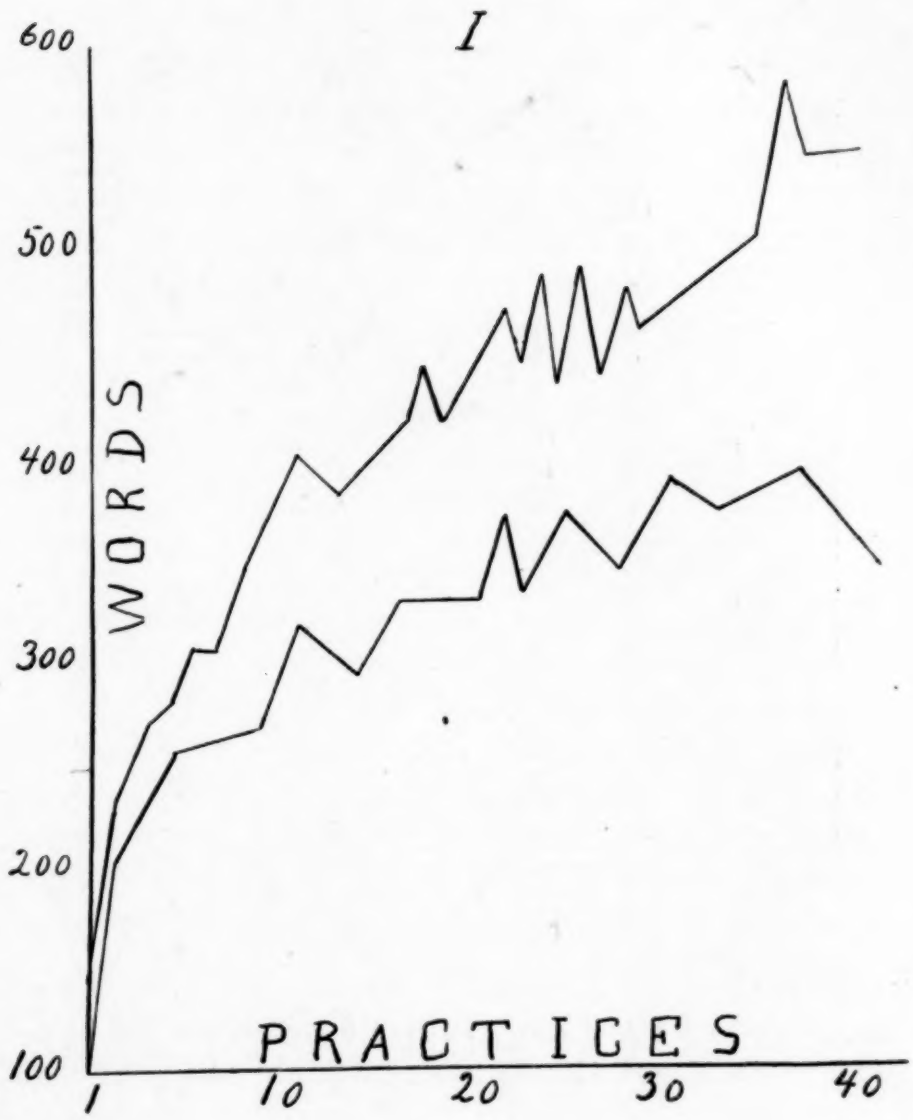
Results.

In Table I, the results are shown in detail. In this table, speed alone is considered.

TABLE I.

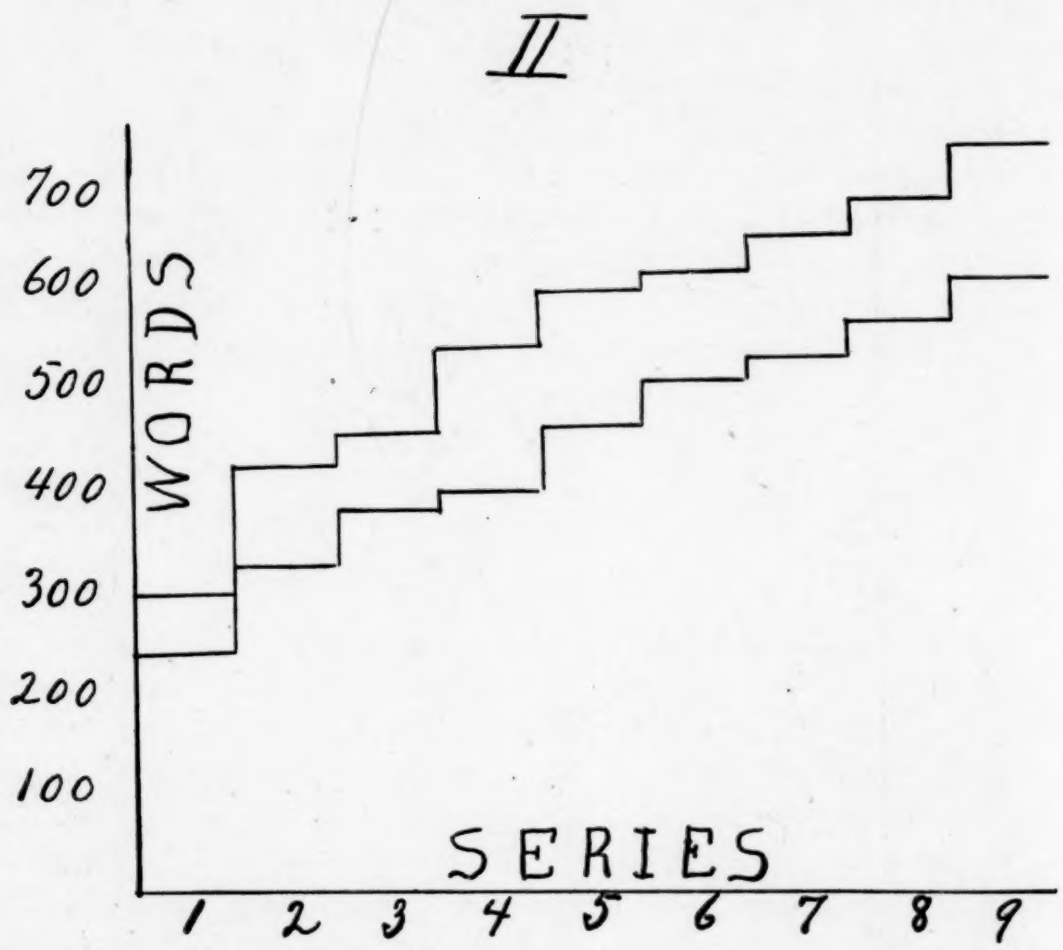
No. of practice.	Speed, *Fast* group.	Speed, *Slow* group.	*Slow* group faster.	*Slow*, per cent. faster.	No. of practice.	Speed, *Fast* group.	Speed, *Slow* group.	*Slow* group faster.	*Slow*, per cent. faster.
1	99	142	43	43	46	442	572	130	29
2	204	228	24	11	47	453	623	170	37
3	223	252	29	13	48	470	596	117	24
4	238	273	35	14	49	479	617	138	28
5	259	280	21	08	50	472	621	149	31
6	249	307	58	23	51	458	593	135	29
7	250	308	58	23	52	499	585	86	17
8	262	338	76	29	53	474	586	112	23
9	263	352	89	33	54	506	614	108	21
10	287	370	83	29	55	533	617	84	15
11	324	404	80	24	56	507	616	109	21
12	308	392	84	27	57	445	550	105	23
13	316	385	69	21	58	544	617	173	13
14	295	391	96	32	59	534	617	83	15
15	307	411	104	33	60	455	616	161	35
16	335	413	78	23	61	524	646	122	23
17	324	450	126	38	62	528	639	111	21
18	337	403	66	19	63	546	644	98	18
19	336	435	99	29	64	537	641	108	19
20	333	459	126	37	65	533	645	112	21
21	377	468	91	24	66	521	624	103	19
22	328	451	123	37	67	491	653	162	33
23	365	488	51	33	68	492	653	161	32
24	380	431	125	13	69	494	600	106	21
25	377	502	125	33	70	482	643	161	33
26	375	448	73	19	71	511	546	35	07
27	350	487	137	39	72	546	606	60	11
28	376	472	96	25	73	551	696	145	26
29	394	478	84	21	74	585	688	103	18
30	394	492	98	25	75	548	666	118	21
31	392	487	95	24	76	538	710	172	32
32	381	496	115	30	77	544	685	141	26
33	390	505	115	29	78	570	730	160	28
34	393	518	125	31	79	564	733	167	29
35	397	524	127	31	80	558	680	122	35
36	405	595	190	47	81	552	726	174	31
37	382	557	175	45	82	576	730	154	26
38	388	564	176	45	83	576	754	178	31
39	360	554	194	53	84	583	721	138	23
40	351	557	206	58	85	615	735	120	19
41	418	502	84	20	86	600	689	89	14
42	425	545	120	28	87	633	739	106	16
43	448	578	130	29	88	631	737	106	16
44	457	566	109	23	89	590	709	119	20
45	479	599	120	25	90	606	753	147	24

The results tabulated in Table I are shown in graphical form in plates I and II. Plate I shows the improvement in speed for the first forty practices. It will be seen that the *Slow* group gained on the *Fast* group throughout these forty



practices. However, for the remainder of the experiment, the difference between the groups was not so great and remained nearly constant. In plate II, the improvement of the two groups is shown for the whole experiment. The graphs in plate II were constructed by taking the average of the practices in groups of ten. The first level shows the average speed for the first ten practices; the second level shows the average speed for the second ten practices, and so on.

The relative speed of the two groups shown in plate II, may be indicated in per cents. This is done in table II. The table is constructed as follows: As shown in plate II, the ninety practices are divided up into nine series of ten practices



each. By determining how much the speed of the *Slow* group exceeds the speed of the *Fast* group and expressing this excess in per cent, we can get the figures of table II. The figures of the first horizontal column, 1 to 9, give the number of the series. The lower figures give the per cent of excess of the *Slow* group's speed over the *Fast* group's speed.

TABLE II.

1	2	3	4	5	6	7	8	9
23	28	27	39	27	21	23	23	22

It will be seen that the average speed of the *Slow* group for the first ten practices is 23% better than that of the *Fast* group, and this difference has increased to 39% in the fourth series. This difference, it will be seen, grows less and remains fairly constant for the last forty practices. If now, instead of comparing one group with the other as in the above

table, we find the improvement within each group, comparing the speed of each series with the speed of the preceding series, we get the results shown in table III. This table was constructed by dividing the average speed of each series by that of the preceding series. The table shows the improvement thus determined in terms of improvement. To illustrate: the .37 of the first column means that the *Fast* group in the twentieth to the thirtieth practices made an average speed 37% better than that made in the first ten practices.

TABLE III.

Series.....	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	Average.
Fast group...	.37	.15	.03	.18	.09	.04	.07	.08	12.6%
Slow group...	.50	.11	.13	.09	.03	.06	.05	.06	12.8%

The table shows that the average improvement of the two groups is almost exactly the same, although this improvement is differently distributed. The *Slow* group has the greater ratio of improvement from the first to the second, third to the fourth, and sixth to seventh series. If we compare the last series with that of the first series, we find that the speed of the *Fast* group for the last ten practices was 2.56 times its average speed for the first ten practices. The corresponding ratio for the other group was exactly the same. If, instead of comparing the last ten practices with the first, we compare the last two practices with the first two practices, we find that the *Fast* group attained a speed 3.96 times its initial speed, while the *Slow* group attained a speed 3.95 times its initial speed. It therefore appears that, although the *Slow* group made much the better speed absolutely, the ratio of improvement was almost exactly the same for the two groups.

The average speed in the different series, on which the above calculations are based, is shown in the following table:

TABLE IV.

Series.....	1	2	3	4	5	6	7	8	9
Fast group...	233	321	371	383	452	495	515	551	596
Slow group...	285	414	471	535	582	601	639	674	729

Accuracy.

The errors were counted as indicated in the rules given above. From the very first, the *Slow* group made more errors than did the *Fast* group. The number of errors made by the different subjects was very constant. Some subjects made very few errors at any time; some were inaccurate from the first. The greater absolute speed of the *Slow* group is, doubtless, to be in part accounted for by the greater inaccuracy of the members of this group. In table V are shown the errors for the first five and the last series.

TABLE V.

Series	1	2	3	4	5	9
Fast group	102	110	101	84	99	154
Slow group	128	122	146	186	265	498

If the number of errors be put into percentages, it is seen that the *Slow* group makes respectively 25, 12, 44, 121, 167, and 223 per cent more errors than did the *Fast* group in the first, second, third, fourth, fifth and ninth series respectively. The errors for the *Slow* group increased nearly four times, while the errors for the *Fast* group increased only about one and a half times.

The Permanent Effects of Practice.

Practice began on the 16th day of June, 1913, and continued for nine days for the *Fast* group. The *Slow* group began at the same time and completed practice on the 12th day of August following. On the 20th of September following, four of the subjects who had returned to the university were tested to determine the after-effects of practice. Two of these subjects were in the *Fast* group and two in the *Slow* group. All four subjects were given a half-hour test, and two of the subjects continued practice for ten practices afterward, at the rate of two half-hour practices each day, one in the forenoon and one in the afternoon. The two *Slow* subjects were Tillery and Kelley and the two *Fast* subjects were Flood and Mumford. The results may be summarized as follows: In

the September test-practice, the *Fast* subjects have a speed which is 70% of their last summer practice, 72% of the average of the last two summer practices, and 66% of the highest speed attained in the summer. The corresponding figures for the *Slow* group, are 77%, 78%, and 72%. The *Slow* subjects retained the effects of practice somewhat better, but of course, it had not been so long since they stopped practice. However, Flood and Tillery continued practice to see how soon they would regain their former speed. They each did so on the tenth practice. In these ten practices, Flood, of the *Fast* group, made an average of 532 words per half-hour which was 89% of her speed at the close of summer practice. Tillery made an average sped of 693 words, which was 88% of her speed at the close of summer practice. I regret that I was unable to test the after-effects for all the subjects. I attempted to do so, but those subjects who were absent from the university were not able to perform the test with sufficient care and accuracy. As far, then, as we have any means of determining, the *Fast* group retained the effects of practice nearly as well as did the *Slow* group, and could regain their speed in the same length of time.

Discussion and Interpretation.

A study of the results presented in Table I shows that for the *Fast* group in the first day's work, concentrated effort is efficient for about five practices, but the speed improved very little the first day after the fifth practice. As far as the first day's work is concerned, this agrees closely with the results of the experiment reported in the first paragraph of this article. On the eighth practice at the end of their fourth day, the *Slow* group was writing 25% more words than was the *Fast* group, and this is the average difference between the two groups for the whole experiment. A comparison of the percentage differences exhibited in table I shows that this difference between the groups fell off from 43% in the first practice to 8% in the fifth practice. This means that when one starts to acquire a skill such as running a typewriter, it pays to put in several practices—about five—in quick succession on the

first day. The effects of the early practices are evidently much greater if soon repeated. However, from the fifth practice to the fortieth, the *Slow* group rather steadily gained on the *Fast* group, but from the fortieth to the sixtieth practices, the difference between the two groups diminished. In the fourth series, the difference was nearly 40% while in the sixth series the difference was only 21%, as can be seen by reference to Table II.

The evidence points to the fact that, under the same conditions, the *Fast* group was no better at learning than was the *Slow* group, in fact it was probably a little poorer. The showing of the *Fast* group in the concentrated practice is therefore remarkable. The distributed practice is the best, *but the concentrated practice brings in good returns, and if one is in a hurry to acquire a skill, the diminished returns for concentrated practice need not be considered prohibitive.*

While inferences from one type of experiment to another are dangerous, the conclusion that the results here obtained would apply to learning to play the piano is probably warranted.

SOME EXPERIMENTAL EVIDENCE IN REGARD TO FORMAL DISCIPLINE.

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SUMMARY.

In the first experiment two groups of 9 adults each practiced for two periods in cancelling from a printed page given parts of speech. One group then devoted 14 periods to cancelling *e*'s and *t*'s. The group practiced in letter cancellation was superior in the beginning to the other group. In the final test this group showed only small gains for nouns, verbs and prepositions and losses for pronouns and adverbs, whereas the unpracticed group showed distinct gains for all parts of speech.

In the second experiment the same general plan was followed, but with different material and subjects. Practice in a substitution test (writing digits for letters) was found to be positively advantageous for subsequent substitution tests of writing symbols for digits, but to interfere with the writing of digits for symbols. The more the period of practice was distributed, the more pronounced were these subsequent transference effects.

First Study.

The first of the two studies here reported was made in 1906-'07 when transference itself was an issue and subjected to severe criticism. The immediate aim was to determine the effect that skill acquired in striking out *e*'s and *t*'s might have upon striking out the parts of speech.[1] (12. pp. 253-254.) Stated in a general way, the problem is to ascertain what effect, if any, practice in responding to familiar forms has upon the apprehension of a specific meaning. Striking out the letters in a printed page merely involves the observation

[1]Partially reported in Quarterly Bulletin State Normal School, Duluth, Minn., Feb. 1909.

of two well-known forms: striking out the words, on the other hand, required an appreciation of their function in the sentence.

Material.

The material for the study in both the test and the practice series consisted of pages cut from U. S. Government reports of the Navy and Interior departments; pages were selected uniform in type and about equal in amount of subject matter. The work was done by seventeen members of the senior class and the writer in connection with a course in educational psychology given at the Duluth State Normal School. Two groups, each composed of nine members, were formed and are designated practice group and control group, respectively. The latter, of course, struck out no letters.

Procedure.

At the beginning both groups worked together on two successive days, 45 min. each day, striking out the parts of speech. The work consisted of a series of trials and each trial was devoted to striking out on two pages of printed matter all the words belonging to a given part of speech. No page of printed matter was used twice, while the part of speech to be struck out was changed at each trial, first nouns, second verbs, third prepositions, fourth pronouns, fifth adverbs. The time for each trial was measured in seconds with the help of stop-watches. The experimenter gave the signal for starting and each subject signalled his completion of the two pages by raising his hand. The results have all been expressed in number of words or letters struck out per minute.

The practice group then spent 14 days, from 30 to 40 min. each day, in striking out *e*'s and *t*'s. On the 18th day from the beginning of the experiment, the two groups reassembled and spent, on two days, two more periods of 45 min. each in striking out the parts of speech under conditions similar to the preliminary period. The trials devoted to the parts of speech are designated first and second period, respectively. The first period is before, the second after the practice period (for the practice group). The control group participated, of course, in these two periods only.

Results.

During the practice period each subject gained in speed of striking out letters, though the amount of gain shows wide variations. The percentage of increase in speed ranges from 31 to 168, with an average of 89.

We turn next to the work done in crossing out parts of

TABLE 1.

Comparing the Averages of the First and Second Periods of the Practice Group and of the Control Group.

Practice Group.

	Nouns.	Wrong Words.	Omitted.	Verbs.	Wrong Words.	Omitted.	Prepositions.	Wrong Words.	Omitted.	Pronouns.	Wrong Words.	Omitted.	Adverbs.	Wrong Words.	Omitted.
After practice.....	34.0	1.6	12.6	11.4	5.0	6.0	28.0	0.5	7.2	5.2	2.3	6.3	3.5	0.6	6.3
Before practice..	28.6	4.6	17.3	9.8	6.5	4.0	25.9	3.0	8.2	6.0	4.4	5.0	6.6	1.7	9.3
Differences.....	5.4	-3.0	-4.7	1.6	-1.5	2.0	2.1	-2.5	-1.0	-0.8	-2.1	1.3	-3.1	-1.1	-3.0

\- sign indicates loss after practice.

Control Group.

Second period.....	30.4	1.4	10.3	11.3	6.0	7.0	26.6	1.7	9.3	5.0	0.6	4.0	5.5	0.7	7.0
First period.....	23.5	5.1	17.0	8.7	7.0	5.0	16.6	2.6	10.5	4.6	0.3	13.7	4.4	2.0	13.0
Differences.....	6.9	-3.7	-6.7	2.6	-1.0	2.0	10.0	-0.9	-1.2	0.4	0.3	-9.7	1.1	-1.3	-6.0

\- sign indicates loss at second period.

speech. Table I shows the final averages for both groups in both periods with respect to three items, average rate per minute in striking out the words (a quantitative measure), number of words wrongly crossed, and number of words omitted (both qualitative measures).

Inspection of these averages will show (1) that even in the first period the practice group was superior in both quantity and quality of work, (2) in the second period (after practice), the practice group remained faster than the control group (save in speed of work with adverbs), while qualitative differences cannot be made out, but (3) the practiced group showed in the second period a loss in speed for pronouns and adverbs, and only a relatively small gain for nouns, verbs and

[2]The gain for prepositions is, as a matter of fact, illusory. It is due to the extremely low score made in the first period by one subject, who omitted 40 prepositions during this part of the work. When her record is omitted, the practiced group falls off for speed with prepositions in the second or after-practice period.

prepositions,[2] while the control group showed a distinct gain in speed for all parts of speech.

A few words should be said in explanation of these results. The superior work of the practice group in the first period was due perhaps to a higher state of interest, or better emotional dynamics. Compared with the control group, they felt that more was expected of them, that they were "Gideon's band," so to speak, and that their efforts would be more closely inspected. The control group had no such incentives. They regarded their part as routine class work. One of them remarked to me that she never felt that she was in the experiment.

The meaning of the relatively inferior work of the practice group in the second period is made out in part from the reports of the members of the group. One says: "In crossing out parts of speech one always had to think what part of speech the word was." "The crossing out of the letters became a habit and instead of crossing out words one wanted to cross out *e*'s and *t*'s. These seemed to be seen so much more clearly than the parts of speech." Another writes: "The practice with *e*'s and *t*'s hindered me in dealing with the parts of speech. I think it was because I became accustomed to looking for *e*'s and *t*'s and the tendency was to cross out those letters rather than the parts of speech." A third says: "There was, however, a tendency to cross out words containing *e*'s and *t*'s rather than the required part of speech."

My own experience tallies with that of the students, the *e*'s and *t*'s claimed attention even in irrelevant words. In the right word, these letters, if present, were often the only part crossed—this was contrary to our rules of work; a word required a horizontal stroke, letters an oblique stroke. They at times seemed to be in heavier print than the other letters. This illusion persisted for six months. In dealing with the letters our attention was given to mere form, and when working with words it was directed to their use in a sentence. The letter-habit interfered with the word-marking process, and the subject was thereby incapacitated for that manner of work. These results find confirmation in our common life. "One who has learned to concentrate altogether on the mean-

ing of the printed page finds it extremely difficult, if not impossible, to read proof correctly. And conversely, a first-class proof reader is likely to be a slow reader."

Second Study.

The data for the second study have been given to the writer by Professor W. F. Dearborn, and were secured by him since 1910 from his classes in educational psychology at Chicago, Harvard and Wisconsin Universities and Radcliffe College.

The problem, like that of the first study, concerns the effect upon a given performance of previous practice in a similar performance under different specific conditions. More precisely, the problem is: what effect does the acquisition of skill in substituting digits for letters in a section of prose have upon the substitution of symbols for digits or of digits for symbols?

Material.

The material for the test series (both before and after the practice period) consisted of two substitution tests. The first of these is illustrated in Starch, *Experiments in Educational Psychology,* pp. 50 and 68. The second is a similar test, save that the task is to place digits in the appropriate symbols. The material for the practice series (substituting digits for letters) is illustrated in Starch's book, pp. 52-67.[3]

Procedure.

The general plan of the experiment is similar to that of the first study.[4] There were, however, certain irregularities in the amount of practice, also its distribution, as is indicated in Table 2. There were a few cases in certain of the groups in which the practice work was not distributed strictly as prescribed and as indicated in this table, but the results for these few cases do not appear to have been affected by these lesser irregularities. The records are probably not sufficiently reliable to serve as bases for the plotting of work-curves, but they seem, from all indications, to be sufficiently reliable for the study of transference.

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[3]The material has also been printed in this Journal, 1:1910, pp. 380 and 382.

[4]See Starch, Op. cit. ch. 7.

Results.

During the practice period, the increase between the first record and the best record subsequently made varied, for individual subjects, from 90 to 333 per cent. The average improvement for most of the groups of subjects was somewhat better than 200 per cent. Practice, in other words, had a decidedly favorable effect upon the process of substituting digits for letters.

The transference of this practice-effect in the two test forms is found to be regularly positive when the second task is writing symbols for digits (Table 2, 4th column), but frequently negative when the second task is writing digits for symbols (5th column).

The amount of improvement that would result in these two test forms by mere repetition, without intervening practice upon another type of substitution test, was determined by work with another group of subjects. This unpracticed group (not shown in Table 2) gained in their second trial 15.2 per cent. in writing symbols and 21.9 per cent. in writing digits, whereas the group that had had intervening practice in writing digits for letters gained 23.7 per cent. in writing symbols for digits, but only 7.7 per cent. in writing digits for symbols. These data make it probable that practice in writing digits for letters is transferred with favorable effect to subsequent work in writing symbols for digits, but is transferred with unfavorable effect upon subsequent work in writing digits for symbols. This effect might perhaps have been expected a priori on the assumption that interference of associations would appear in the second test series where the same characters (digits) were written, but with different associative connections.

TABLE 2.

Practice and Its Transfer in Substitution Tests.

Practice in Writing Digits for Letters.			Improvement in Test Series (before and after practice).	
No. Subjects.	Days' Practice.	Av. Per Cent. Improvement.	Symbols for Digits.	Digits for Symbols.
2	1	193.6	15.3	59.7
3	2	173.6	25.2	21.0
2	4	123.3	38.3	—8.7
1	5	245.4	44.4	—14.2
13	10	213.3	15.4	14.8
1	20	273.5	17.7	—26.3

Not only this, but, as Table 2 shows, the more practice is spread out in time, *e. g.*, over 20 days instead of restricted to one day, the larger, on the whole, are the negative values. In passing from 1 day to 20 days, the percentage of increase of efficiency rises from 193.6 to 273.5, and, with a few exceptions, to be expected from the small number of cases in some groups, the relative gain is approximately parallel to the extent of distribution of the learning periods, which confirms the principle, familiar in the psychology of learning (Ebbinghaus, Jost) of positive advantage gained by distributing learnings.

It would be tempting, if our data were based upon a larger number of records, to draw inferences concerning the existence of an optimal amount of practice for subsequent transfer. It would appear, for example, that in the fourth column of Table 2, the positive transfer-effect in writing the symbols was greatest for those subjects who had had a moderate amount of distribution in their practice series and that both those who spread their practice widely (10-20 days) or who concentrated it into one or two days realized less profit in the transfer. We would suggest that this problem might be worth attacking in a more extensive and careful investigation.

Discussion.

A resume of the literature cannot well be given here, but I may call attention to the original papers of James (8. p. 667), and of Ebert and Meumann (4. pp. 1-232), to the symposium by Angell, Judd and Pillsbury (1. pp. 1-33) and briefly mention a few texts:

Henderson (7. Chap. X.) gives a succinct account of the origin and growth of the formal discipline concept, pointing out its connections with past and present systems of psychology. Both Colvin (2. Chap. XIV.) and Ruediger (10. Chap. VI.) submit in their respective texts a critical estimate of the experimental literature together with theoretical discussions.

The experimental evidence thus far adduced concerns transference of motor adjustment, of memory, of attitudes of attention and of ideas and methods; and transfer has expressed itself in three ways, (1) by increasing the facility and efficiency of the process to which the transfer is made, (2) by inhibiting the learning process and (3) by suppressing or by

narrowing the range of the capacity involved. Our first study points unmistakably to a more effective co-operation between hand and eye as a result of striking out the letters, and to a significant modification in the attitude of attention toward the two letter forms—thereby prejudicing the subject against apprehending the use of words as parts of speech. The sensory stimulation of the letters even though irrelevant to the test series, was more direct and striking and therefore more compelling than the abstract ideational appeal of the words. It shows that acquired skill of a very special sort does influence other activities. Here it slightly increased achievement by one agency and decidedly hindered it by another. Judd has shown that new attitudes of attention may either favor or hinder the acquisition of a habit depending on conditions. Angell observes, "Personally I am disposed to believe that the most important elements in the whole situation are capable of statement in terms of attention." And he contends further "that there would be formed some matrix common to all acts of attention, and any development whatever would affect this central core in some degree." It is as if our mental life, as a whole, levies a tax for general purposes upon special processes and that the manner and application of the levy are made through the gateway of attention.

The author's hearty thanks are due to Professor Whipple for his painstaking criticisms in arranging the paper, and also to Professor Dearborn for his generosity in furnishing the material for the second study.

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3. W. F. DEARBORN. *Experiments in Learning.* Jour. Ed. Psych., Vol. I., Sept., 1910.
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SCHOOL AND TEACHER MEASUREMENT.

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During the past few years this device for school and teacher measurement has been gradually assuming the form in which it is now presented. It is probably full of imperfections still, but the idea is new at least in part, and it is offered as an attempt to make, what we have been talking a great deal about, namely, school measurements.

This endeavor to construct an instrument for school measurement has for its object the reduction of guess work in the important function of rating teacher and schools. It is not offered in any sense as a competitor to the numerous and costly boards of investigation. It is believed, however, that individual teachers and school officers may find it useful. The conscientious teacher can apply the teacher measurement to herself, and by a careful checking process she would be able to find her weak points.

A superintendent could easily and emphatically impress important principles upon a teacher's mind by means of this device. For example, a superintendent would call a weak teacher, or perhaps a fairly strong teacher with a few bad defects, to his office. She would then be asked to carefully rate herself according to the scale; thereafter the superintendent would fill in the sheet graphically, and show her her standing as rated by herself. Of course, it is true that she might rate herself too highly, but the chances are that this would not be the case, and whatever the outcome, this process is an excellent preparation for any verbal constructive criticism that the superintendent might wish to make.

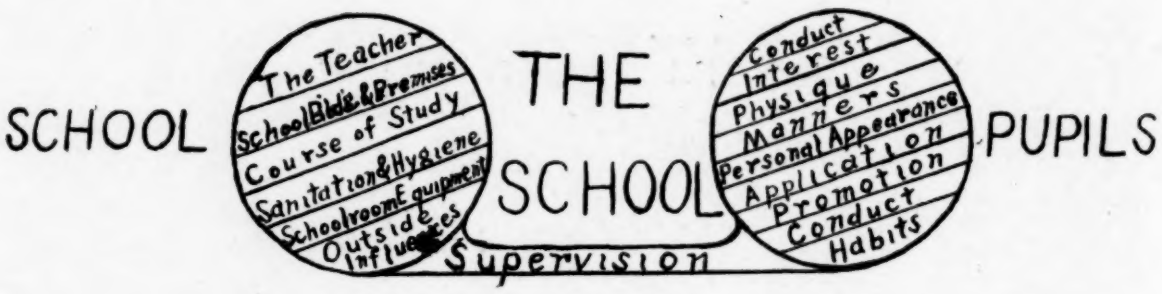

FIG. 1.

The whole of any school is graphically represented in Fig. 1. To have something more than an arbitrary assignment of the school factors as represented in the first circle, fifty prominent school men including superintendents, college presidents, college professors of education, teachers and normal and high school principals, from Maine to California, were asked to give the proportions of 100 they would assign to these six factors. Nearly all responded, and while the individual judgments are little better than guesses, the average of all these judgments is much more than a guess.

The averages are as follows:

The teacher	60%
School building and premises	5%
Course of study	10%
Sanitation and hygiene	10%
Schoolroom equipment	5%
Outside influences	10%

The average proportions are diagramatically represented in Fig. 2.

The value of the teacher is probably overestimated, for several of those who replied included supervision under this head. However, that does not materially affect the value of this measuring stick as a whole; it rather enhances the value of the scale for teacher measurement, here given in full.

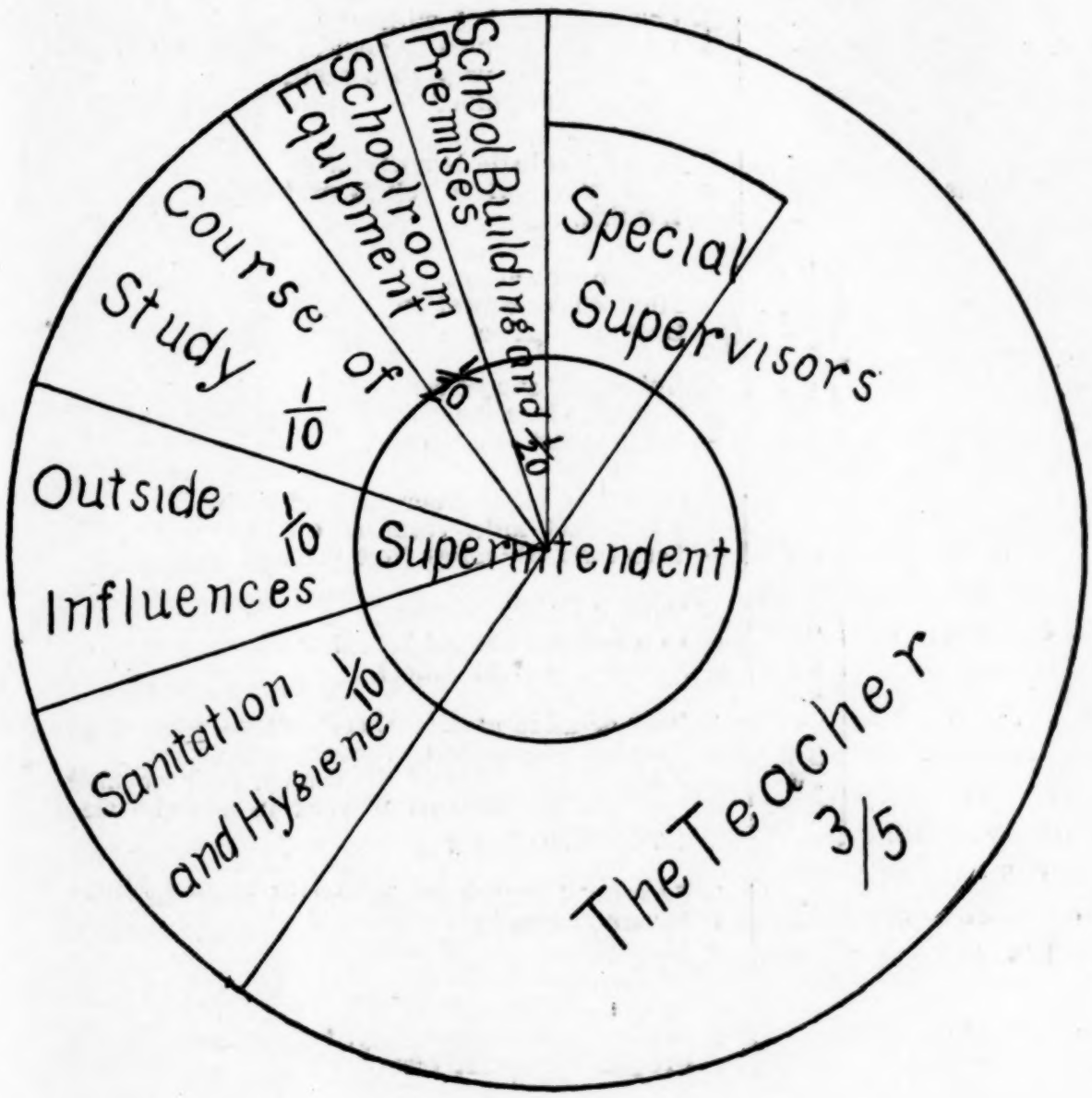

Fig. 2.

Diagram showing value of different school factors.

MEASURING SCALE FOR TEACHER MEASUREMENT.

1.	Morals.	+ Uplifting influence on others. *a* Upright but not influential. — Questionable character.
2.	Leadership.	+ Among students and in community. *a* Among students only. — Lacking.
3.	Personality.	+ Magnetic. *a* Not magnetic but able to command respect and attention. — Too quiet or too talkative.

4.	Personal Appearance.		+ Commanding but without pomp. Well dressed. *a* Clean but inclined to neglect the charm of good dress. Not very good taste. — Untidy, undignified.
5.	Ideals.		+ Of an idealistic temperament. *a* Narrow (local or selfish or both). — Lacking.
6.	Education.	Elementary Teacher.	+ College education. *a* High school education. — Grammar school education.
		Secondary Teacher.	+ University education. *a* College education. — High school education.
7.	Travel.		+ Over 1000 miles from place of birth. *a* 500 to 1000 miles from place of birth. — Less than 500 miles from place of birth.
8.	Professional Training.	Elementary Teacher.	+ Normal school graduate. *a* One year of normal school work. — Summer normal school.
		Secondary Teacher.	+ Year or more at a teachers' college. *a* Summer session at a teachers' college. — Majored in college in the subject now teaching; or did undergraduate work in a department of education.
9.	Experience.		+ Successful experience in several positions. *a* Several years in one position. — Frequent change of position.
10.	Physical Ability.		+ Strong and vigorous. *a* Seldom absent from duty, but not very rugged. — Frequently absent from duty.
11.	Endurance.		+ Tenacious. *a* With close supervision able to keep at a thing until it is mastered. — Changeable.
12.	Action.		+ Energetic. *a* Easy going. — Lazy.
13.	Reliability.		+ Does more than is required. *a* May be depended on for all requirements. — Sometimes fails to do all expected, or is late in getting things done.
14.	Resourcefulness.		+ Shows quick mental grasp, decision and initiative. *a* Has some capacity for independent action. — Has to be told how to do everything new.

15. Study Habit.	+ Is diligent in study, careful in planning. *a* Studies daily without much system. — Does nothing outside of preparation of subjects taught.
16. Professional Spirit.	+ Recognizes greatness of teaching profession. *a* Considers teaching as good occupation until marriage, or as stepping stone to some other business or profession. — Indulges in destructive criticism of fellow-teachers.
17. Professional Reading.	+ Educational papers and books. *a* Some educational paper. — Practically nothing.
18. Reading for Breadth and Culture.	+ Constant reader of books of real value (not over 50% fiction); also some periodical like the "Outlook." *a* Little besides fiction. — Practically nothing.
19. Professional Library.	+ Owns more than 10 modern books on education. *a* Owns from 1 to 10 modern books on education. — Owns no such books.
20. Educational Magazines Subscribed to.	+ More than one. *a* One. — None.
21. Educational Organizations Allied with.	+ Local, State, and N. E. A. *a* Local and State. — Local.
22. Neatness.	+ Has high ideal of neatness in everything. *a* Is neat in either personal appearance, or about the schoolroom; not in both. — Is slovenly about person and schoolroom.
23. Thrift.	+ Wise expenditure of salary. Bank account. *a* Wise expenditure of salary. No bank account. — Spends recklessly all the money earned.
24. Disciplinarian.	+ Has the feeling that the pupils want to do his will. *a* Keeps good control, but with considerable anxiety, or by sheer authority. — Allows whispering, noise and confusion.
25. Organizing Ability.	+ Is able to successfully establish new features, such as school gardens, parents' associations, etc. *a* Is successful in maintaining any such features. — Allows such features to die out.

26 TO 40, INCLUSIVE. ABILITY TO TEACH.
(*Apply the same standard to all subjects.*)

+ Knows and applies the best special methods.
a Shows good natural ability; is weak on special methods.
— Shows no methodology and not much natural ability.

26.	Reading.	+ a —
27.	Writing.	+ a — Uses one of the scales for measuring writing.
28.	Spelling.	+ a —
29.	Geography.	+ a —
30.	Drawing.	+ a —
31.	Nature.	+ a —
32.	History.	+ a —
33.	Number or Arithmetic.	+ a — Also uses the Courtis tests.
34.	Physiology and Hygiene.	+ a —
35.	Language.	+ a —
36.	Grammar.	+ a —
37.	Civics.	+ a —
38.	Music.	+ a —
39.	.....	+ a —
40.	.....	+ a —

41.	High School Subjects. { 1..... 2..... 3..... }	+ *a* —
42.	School Civic Improvement.	+ Active in improving and adding to schoolroom, building or premises. *a* Insists on proper care of schoolroom, building and premises. — Irresponsible for the care of school property.
43.	Loyalty to Superior Officers.	+ Constructive helper. *a* Shows acceptable recognition of authority. — Is rebellious or deceptive.
44.	Loyalty to Fellow Teachers.	+ Manifests fraternal spirit. *a* Is chummy with a few, indifferent to the many, cliquish. — Takes selfish or jealous attitude.
45.	Loyalty to Subordinates.	+ Has clear conception and recognition of their rights and feelings, and is ready to defend them. *a* Not actively interested in them. — Domineering.
46.	Ability to take Suggestions.	+ Always willing to receive and to carry out good suggestions. *a* Shows moderate ability to receive and to incorporate good suggestions. — Unable or unwilling to receive suggestions.

GRAPH SHEET FOR TEACHER'S RECORD

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

\+

a

—

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46

\+

a

—

SCORE
No. of + ...
No. of *a* ....
No. of — ....

Date .... Name ..... Age .... Grade .....

Years of Experience .... Remarks

Average score for summary table .....

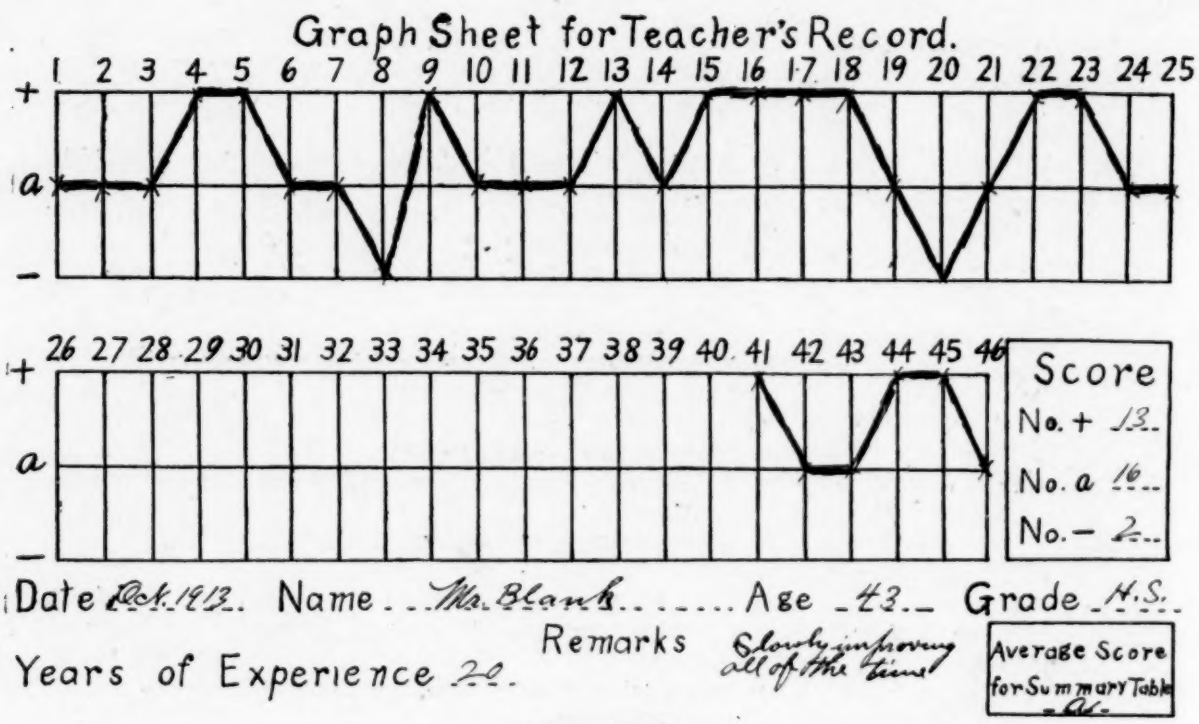
Graph Sheet for Teacher's Record.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
+
a
−
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
+
a
−
Score
No. + 13
No. a 16
No. − 2
Date Oct. 1913. Name Ms. Blank Age 43 Grade H.S.
Years of Experience 20.
Remarks Slowly improving all of the time
Average Score for Summary Table 26

Figure III.

Fig. 3 is the graph of the standing of an experienced high school teacher.

Fig. 4 is that of a very strong grammar school principal. His is a (+) record.

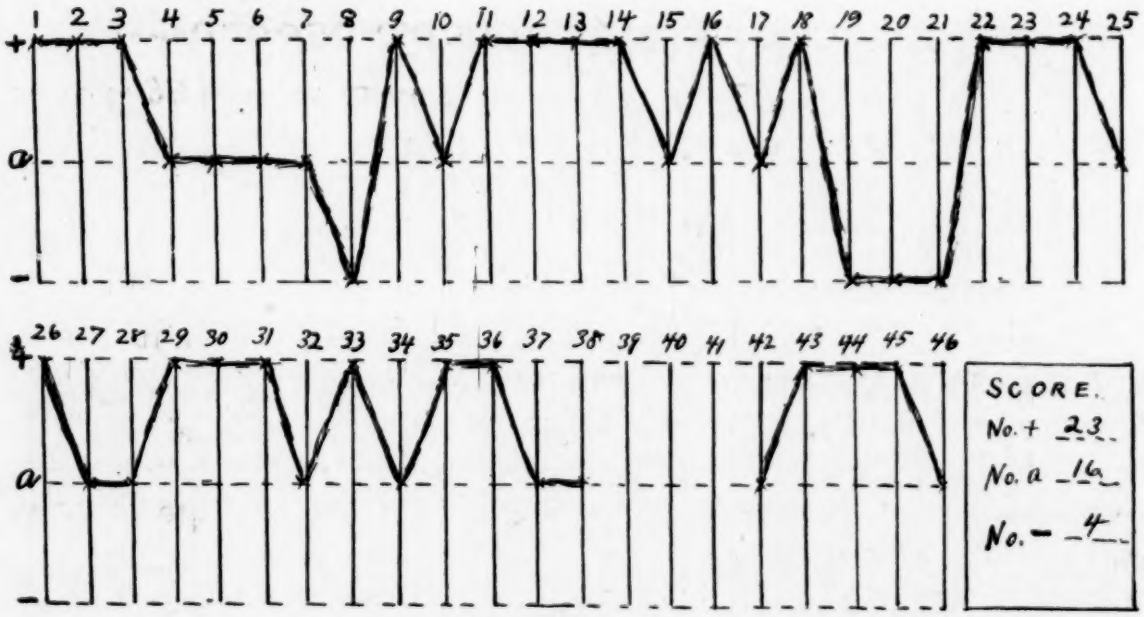

Fig. 4.

While only the teacher measurement is given at this time, four summaries of the entire school measurement are submitted.

SUMMARY TABLE OF SCHOOL EFFICIENCY*

Values. + = 15, 30, 180.
α = ⅔ of the + values.
− = ⅓ of the + values.

	+	α	−	Totals.
Teacher or Teachers.	180	120	60	180
School Building & Premises.	15	10	5	5
Sanitation & Hygiene.	30	20	10	20
Course of Study.	30	20	10	10
Schoolroom Equipment.	15	10	5	5
Outside Influences.	30	20	10	10

Divide by 3 | 230 =

76⅔% Efficiency of Craftsmen & Machinery.

Fig. 5.

*Does not include the measurement of the pupils.

Fig. 5 is the record of a small one room school in New Hampshire as it was four years ago. It was only an apology for a school in fact, until by good fortune a very strong teacher took charge. As the graph shows, the teacher was the one redeeming feature, and on this account the percentage of efficiency is relatively high.

Fig. 6 is the record of the same school two years later. The graph shows a marked improvement in most respects, but owing to the fact that the teacher's rating is considerably below that of her predecessor, the efficiency of the school is only 68⅓ per cent.

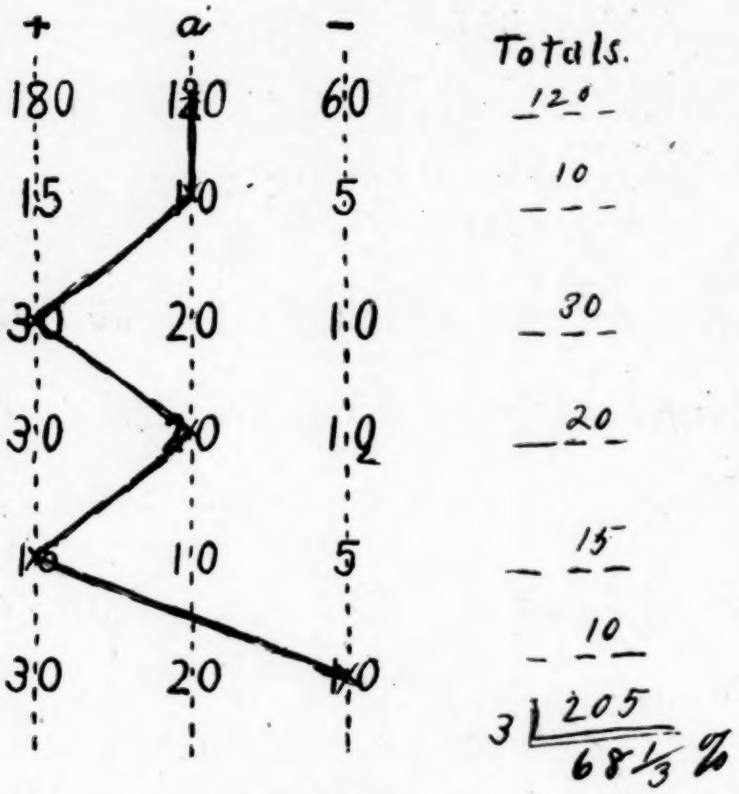

Fig. 6.

Fig. 7 is the graphic standing of a high school of about 200 pupils. The outside influences need to be controlled and improved in order to get better school results.

Fig. 8 is the record of a four room primary school whose pupils come almost wholly from non-English speaking families.

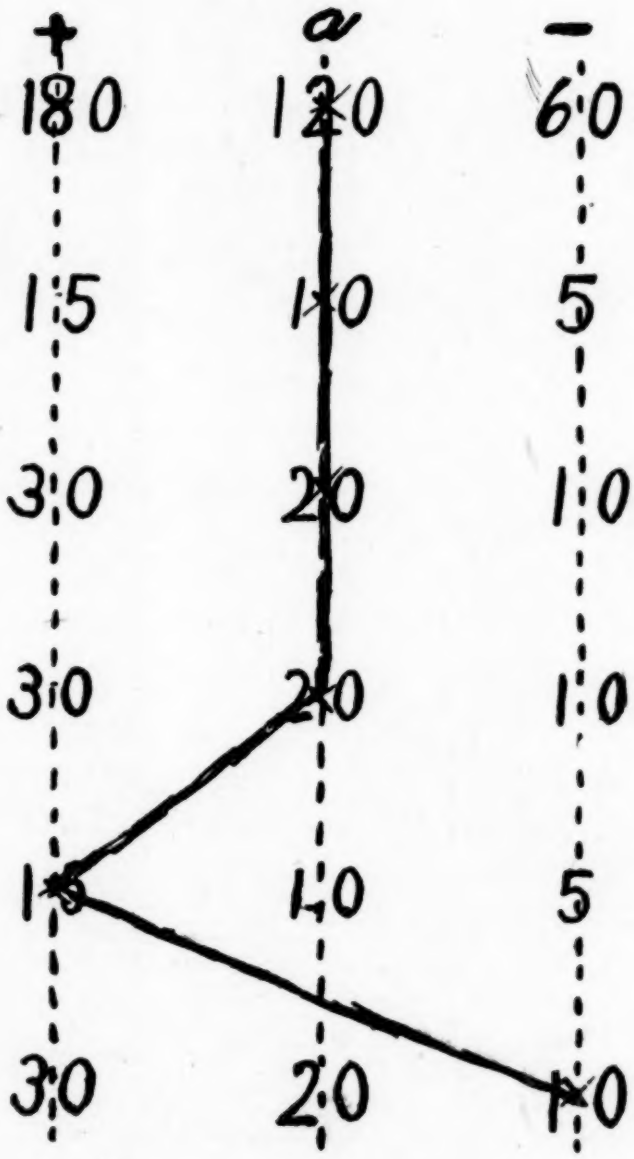

FIG. 7.

Totals.
120
10
20
15
10
3 | 195
65 %.

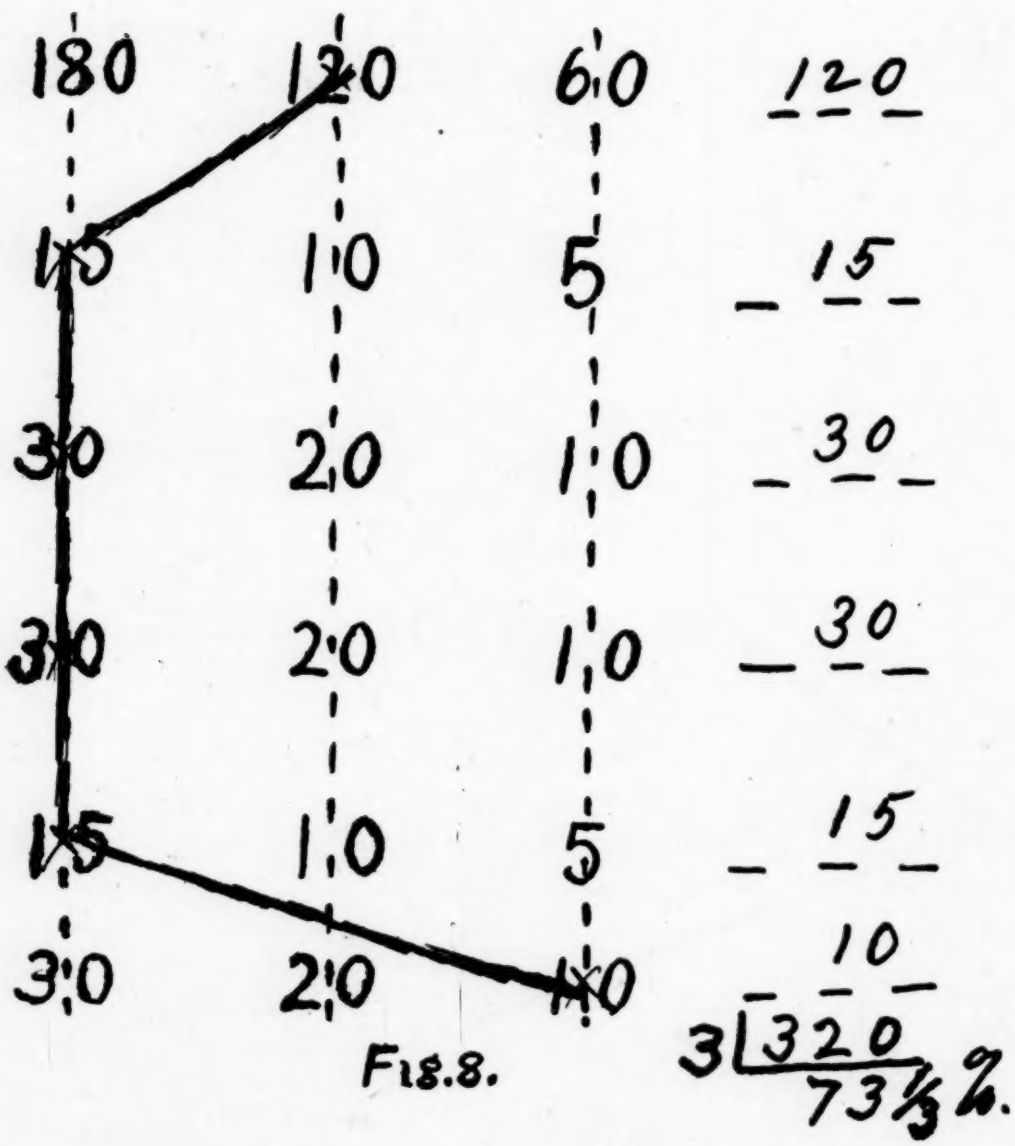
180
120
60
120
15
10
5
15
30
20
10
30
30
20
10
30
15
10
5
15
30
20
10
10
3|320
73⅓%

Fig. 8.

THE BINET-SIMON MEASURING SCALE FOR INTELLIGENCE: AN ANNOTATED BIBLIOGRAPHY. PART II.

SAMUEL C. KOHS,
Vineland Research Laboratory.

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81. GIFFORD, E. G., AND GODDARD, H. H. *Defective Children in the Juvenile Court.* Traing. School. 1912, 8: 132-135.

Binet tests on one hundred juvenile delinquents. Tabulations and conclusions.

82. GIROUD, A. *Etude d'un procédé nouveau pour la mesure du niveau intellectuel.* Bull. Soc. libre Etude psychol. de l'Enfant. 1911, 11: 156-169.

Application of Ferrari's test scheme. Results and conclusions. Suggestive.

83. GODDARD, H. H. *The Binet and Simon Tests of Intellectual Capacity.* Traing. School. 1908, 5: 3-9.

A brief statement of the Binet 1905 scale.

84. GODDARD, H. H. *Suggestions for a Prognostical Classification of Mental Defectives.* J. Psycho-Asthen. 1909, 4: 48-54.

The suggestion is here made for a classification of mental defectives according to "mental age."

85. GODDARD, H. H. *A Measuring Scale of Intelligence.* Traing. School. 1910, 6: 146-155.

Condensed translation of Binet's "Measuring Scale of Intelligence" (1908).

86. GODDARD, H. H. *Four Hundred Feeble-minded Children Classified by the Binet Method.* Ped. Sem., 1910, 17: 387-397. Also J. Psycho-Asthen., 1910, 15: 17-30.

The remarkable accuracy of the Binet-Simon scale is shown when utilized for industrial classification in the Vineland institution.

87. GODDARD, H. H. *The Binet-Simon Measuring Scale for Intelligence. Revised.* Traing. School, 1911, 8:56-62.

Based on Binet's 1908 and 1911 articles, and also on Vineland's experience in testing two thousand normal children. Now in use there.

88. GODDARD, H. H. *Two Thousand Normal Children Measured by the Binet Measuring Scale of Intelligence.* Ped. Sem., 1911, 18:232-259. Also Proceedgs. Nat. Educ. Assoc., San Francisco, Cal., July, 1911, pp. 870-878.

Results and conclusions. The scale found wonderfully accurate.

89. GODDARD, H. H. *The Status of the Binet Tests to Date.* 20. Ann. Meetg. Amer. Psychol. Assn., Dec., 1911.

Remarkable results have already been obtained in different institutions and reformatories with insane and epileptics.

90. GODDARD, H. H. *Echelle mêtrique de l'intelligence. Résultats obtenus en Amérique, à Vineland.* Année psychol. 1912, 18:288-326.

(See the Ped. Sem. 1911 article above.)

91. GODDARD, H. H. *The Responsibility of Children in the Juvenile Court.* J. Crim. Law and Criminol., 1912, 3: — —.

The Binet test used in the examination of one hundred juvenile court cases. Sixty-six per cent were found feeble-minded.

92. GODDARD, H. H. *The Feeble-minded Immigrant.* Traing. School, 1912, 9:109-113.

A successful experiment in the detection of mental defect in immigrants by means of the Binet scale.

93. GODDARD, H. H. *Three Annual Testings of Four Hundred Feeble-minded Children and Five Hundred Normal Children.* 21. Ann. Meetg. Amer. Psychol. Assn., Cleveland, Ohio, 1912-13.

Additional testimony proving the reliability of the scale.

94. GODDARD, H. H. *Report on Ungraded Classes.* Hanus Investigating Comm., New York City, 1913.

The Binet results indicate that there are fifteen thousand feeble-minded children in the New York City public schools. Recommendations.

95. GODDARD, H. H. *The Binet Tests and the Inexperienced Teacher.* Traing. School, 1913, 10: 9-11.

The inexperienced teacher may use the tests for the purpose of a rough diagnosis. The results, however, although not wholly accurate, would still possess sufficient educational significance to be of great value to her.

96. GODDARD, H. H. *Binet Scale Notes.* Traing. School, 1913, 10: 44-45.

97. GODDARD, H. H. *Standard Method for Giving the Binet Test.* Traing. School, 1913, 10: 23-30.

An attempt to standardize the experimental procedure.

98. GODDARD, H. H. *The Improvability of Feeble-minded Children.* J. Psycho-Asthen., 1913, 17: 121-131.

Three annual testings in the Vineland institution of three hundred and forty-six feeble-minded boys and girls, mentally between one and twelve, chronologically between five and forty, showed that a vast majority were making no progress mentally. Conclusions regarding educational treatment.

99. GODDARD, H. H. *The Demand for Tests of Intelligence.* Spring Confr. Exper. Psychologists, Apr. 10-12, 1913.

100. GODDARD, H. H. *Feeble-mindedness a Source of Prostitution.* Vigilance, 1913, 26: 3-11.

Based on statistics gained from the application of the scale to large groups of women inmates in reformatories. Conclusions.

101. GODDARD, H. H. *The Diagnosis of Feeble-mindedness.* Meetg. Alienists and Neurol., June 24-27, 1913.

102. GODDARD, H. H. *The Reliability of the Binet-Simon Measuring Scale of Intelligence.* 4. Intern. Congr. School Hyg. Buffalo, 1913.

Although people are condemning the scale as imperfect, nevertheless intelligence is being constantly and successfully measured. The application of the doctrine of probability to the results proves the small liability of error.

103. GODDARD, H. H., AND HILL, H. F. *Feeble-mindedness and Criminality.* Traing. School, 1911, 8: 3-6.

Out of fifty-six reformatory girls on probation, fifty-two were found to be feeble-minded.

104. GODDARD, H. H., AND HILL, H. F. *Delinquent Girls Tested by the Binet Scale.* Traing. School, 1911, 8: 50-56.

(Same as previous article.)

105. GRADY, W. E. *Measuring Efficiency in Instruction.* Psychol. Clinic, 1913, 7: 145-152.

To be able to measure the efficiency of instruction one must necessarily determine the physical and mental equipment of each pupil before and after educational treatment.

106. GROSSMANN, M. P. E. *The Study of Individual Children.* Plainfield, N. J., Nat. Assn. Study and Educ. Except. Childn. 1912.

Binet tests included.

107. HALL, G. S. *Educational Problems.* New York, London: Appleton. Vol. 2, pp. 82-88.

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108. HART, B., AND SPEARMAN, C. *General Ability: Its Existence and Nature.* Brit. J. Psychol., 1912, 5: 51-84. Also *Über die allgemeine geistige Leistungsfähigkeit.* 5. Kongr. f. exper. Psychol. Berlin, 1912, —: 139-142.

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109. HELLER, TH. *Grundriss der Heilpädogogik.* Leipzig: Engelmann, 1912, pp. 374-377.

Binet's 1905 scale with a discussion of a little of the literature.

110. HEYMANS, G., UND BRUGMANS, H. J. T. W. *Intelligenzprüfungen mit Studierenden.* Zsch. angew. Psychol., 1913, 7: 317-331.

The use of some of the Binet tests among others.

111. HJORTH, B. M. *Binet's Intelligensprove i Amerika.* Nyt Tydsskr. f. Abnormvaes., 1913, 15: 121-125.

A short review of some of Binet's, Kuhlmann's and Goddard's work.

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One hundred and fifty-six subjects. Ages seven, nine and ten. The "Vorschule" children coming from a higher social level tested about one-half year above the "Volksschule" children who come from a lower social level, except at age ten. More must be examined, however, before any such conclusion may be drawn.

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An exposition of the scale with Goddard's adaptations. A small review of the literature.

117. HUEY, E. B. *The Binet Scale for Measuring Intelligence and Retardation.* J. of Educ. Psychol., 1910, 1: 435-444.

A translation of the tests and directions for their use. Need of norms.

118. HUEY, E. B. *Retardation and the Mental Examination of Retarded Children.* J. of Psycho-Asthen., 1910, 15: 31-43.

Suggests the use of the tests in order to determine retardation above the level of feeble-mindedness.

119. HUEY, E. B. *Binet's Scale for Measuring Intelligence.* Volta Rev., 1911, 13: 26-30.

Shows how the scale may be applied to the deaf.

120. HUEY, E. B. *The Present Status of the Binet Scale of Tests for the Measurement of Intelligence.* Psychol. Bull., 1912, 9: 160-168.

An excellent resume of the literature.

121. HUEY, E. B. *Backward and Feeble-minded Children.* Baltimore: Warwick & York, 1912, pp. 189-202.

Directions for using the 1911 scale with the added modifications by Goddard. (The other portion of the book consists of case studies, the Binet tests having been applied to each child.)

122. HUEY, E. B. *A Syllabus for the Clinical Examination of Children.* Lincoln: State School and Colony, 1912.

The Binet scale included.

122a. *Informal Conference on the Binet-Simon Scale: Some Suggestions and Recommendations.* J. of Educ. Psychol. 1914, 5: 95-100.

Recommendations for uniformity of procedure in the administration of the tests.

123. IOTEYKO, I. *Revue Générale des Travaux récents sur l'Enfance anormale.* Rev. psychol., 1909, 2: 238-248.

A summary of articles.

124. IRWIN, E. A. *A Study of the Feeble-minded in a West Side School in New York City.* Traing. School Bull., 1913, 10: 65-76.

Two hundred and one cases. Sixteen per cent mentally defective. A very interesting contribution.

125. JENNINGS, H. M., AND HALLOCK, A. L. *Binet-Simon Tests at the George Junior Republic.* J. of Educ. Psychol. 1913, 4: 471-475.

Twenty boys were tested. Three were morons and four others probably so. Six girls were tested. Two were morons and two others probably so. The mental quotient is of dubious value. More questions needed beyond twelve years. Only experts should apply the scale.

126. JERONUTTI, A. *Applicazione della "Scala metrica dell' intelligenza" di Binet e Simon, e dei "reattivi" di Sante deSanctis, per l'accertamento del grado dell' intelligenza nei fanciulli normale e del grado d'insufficienza mentale nei fanciulli anormalie deficienti Esperienze, comparazionie critiche.* Rivista Pedagog. 1909, 3: 263-281.

Tested one hundred and forty-four children, boys and girls between the ages of three to fourteen. A large number of the tests appear too easy for the Rome children. Also tested twenty-four feeble-minded children.

127. JERONUTTI, A. .....
1. Congr. intern. de Pédol. Bruxelles, 1911.

128. JERONUTTI, A. *Ricerche psicologiche sperimentali sugli alunni molto intelligenti.* Lab. di Psicol. Sperim. della Reg. Univ. Roma, 1912.

Out of fifteen hundred school and kindergarten children, ages five to twelve, fourteen were selected by the teachers as the brightest. The Binet test showed them to be from one to three years in advance of their chronological ages.

129. JOHNSON, R. H., AND GREGG, J. McI. *Three New Psychometric Tests.* Ped. Sem., 1912, 19: 201-203.

An attempt to extend the scale into adolescence.

130. JOHNSTON, K. L. *M. Binet's Method for the Measuring of Intelligence.* School Wld., 1910, 12: 391- . Also Rep. Brit. Assn. Adv. Sci., 1910, 80: 806-808.

Tested two hundred and eighteen girls, ages six to sixteen. Suggests certain revisions.

131. JOHNSTON, K. L. *M. Binet's Method for the Measurement of Intelligence. Some Results.* J. Exper. Pedagog. 1911, 1: 24-31.

Results of tests on two hundred school children in Sheffield, England, explained.

132. JOHNSTON, K. L. *The Measurement of Intelligence. Binet-Simon Tests.* J. Exper. Pedagog. 1911, 1:148-151.

Explanation of the difference between the 1905 and 1908 scales.

133. KATZENELLENBOGEN, E. W. *A Critical Essay on Mental Tests in Their Relation to Epilepsy.* Epilepsia, 1913, 4: 130-173.

Many objections offered to the scale and Wallin's work on epileptics criticised.

134. KELLER, CHR. *Atter Binet's Forstandsprover.* Nyt Tydsskr. f. Abnormvaes. 1911, 13: 289-298. (See also 1909, 11: 1-7; 1910, 12: 42-44, 89-100, 132-144, 316.)
Review of Binet's 1911 revision, and Goddard's additions.

135. KIRKPATRICK, E. A. *The Binet Tests and Mental Ability.* J. of Educ. Psychol., 1912, 3: 337.
Each test determines maturity and not so much potent mental ability. Argues against further extending the number of tests per age.

136. KITE, E. S. *Mental Defect as Found by the Field Worker.* J. of Psycho-Asthen., 1913, 17: 145-154.
Interesting applications of the Binet scale in studying the heredity of feeble-mindedness.

137. KITE, E. S. *The "Pineys."* Survey, 1913, 31: 7-13, 38-40.
Showing how a field worker in heredity gets excellent results without making the technique of testing at all formal or apparent.

138. KNIGHT, C. P. *The Detection of the Mentally Defective Among Immigrants.* J. Amer. Med. Assn., 1913, 60: 106-107.
The problem. Difficulty of solution. Method of examination.

139. KNOX, H. A. *The Moron and the Study of Alien Defectives.* J. Amer. Med. Assn., 1913, 60: 105-106.
The detection of morons one of our immigration problems.

140. KOHS, S. C. *The Binet Test and the Training of Teachers.* Traing. School Bull., 1914, 10: 113-117.
Experience seems to show that school teachers untrained in clinical psychology can be taught to apply the tests and get accurate results.

141. KRAMER, F. *Die Intelligenzprüfung bei kriminellen und psychopathischen Kindern.* 1. deut. Kongr. f. Jugendbdg. u. Jugendkde. Dresden, 1911. Also Leipzig: Teubner, Arbeiten des Bundes für Schulreform. 1911, pp. 28- .
Results and suggestions.

142. KUHLMANN, F. *Binet and Simon's System for Measuring the Intelligence of Children.* J. of Psycho-Asthen., 1911, 15: 79-92.

A translation of the 1908 scale with comments on each test. After examining over thirteen hundred cases, he finds this method of great value and service.

143. KUHLMANN, F. *A Reply to Dr. L. P. Ayres' Criticism of the Binet and Simon System for Measuring the Intelligence of Children.* J. of Psycho-Asthen., 1911, 16: 58-67.

Many of the Ayres' criticisms are shown to be absolutely unfounded.

144. KUHLMANN, F. *The Present Status of the Binet and Simon Tests of the Intelligence of Children.* J. of Psycho-Asthen. 1912, 16: 113-139.

A general review of the work done in France, Germany and America.

145. KUHLMANN, F. *A Revision of the Binet-Simon System for Measuring the Intelligence of Children.* Faribault, Minn.: J. Psycho-Asthen. No. 1 Monogr. Suppl. 1912, pp. 41.

146. KUHLMANN, F. *The Results of Grading Thirteen Hundred Feeble-minded Children with the Binet-Simon Tests.* J. of Educ. Psychol., 1913, 4: 261-268.

Some revisions suggested.

147. KUHLMANN, F. *Degree of Mental Deficiency in Children as Expressed by the Relation of Age to Mental Age.* 4. Intern. Congr. School Hyg. Buffalo, 1913. Also J. Psycho-Asthen., 1913, 17: 132-144.

The difference between mental age and chronological age does not represent the true degree of deficiency. The "rate of mental progress" is chosen as much more representative.

148. KÜLPE, O. *Psychologie und Medezin.* Zsch. f. Pathopsychol. 1912, 1: 187-267.

Does not believe that there is much comparative value in "mental age." Thinks Binet exaggerated the value of the scale. It is not a true psychological experiment because it lacks the aid of introspection.

149. LAPIE, P. *Avancés et retardés.* Année psychol., 1912, 18: 233-270.

Among others, a few of the Binet tests were given to twenty-three boys and one girl, some being advanced and some retarded. Emphasizes the need for conserving the physical and mental vigor of the child.

150. LAWRENCE, I. *A Study of the Binet Definition Tests.* Psychol. Clinic. 1911, 5: 207-216.

Tested seven hundred and eighty-four Minnesota school children, using only four of the regular series. Suggests changing the scale at both ends.

151. LEY, A. *Les enfants anormaux.* Année psychol., 1912, 18: 503-519. Also L'Enfance Anorm., 1913, 7: 37-52.

A review of the recent studies on the value of the scale.

152. LIPMANN, O. *The Examination of Intelligence in Children.* School World. 1910, 12: 366-369. Also Rep. Brit. Assn. Adv. Sci. 1910, 80: 802-804.

The frequency and distribution of the results obtained through the use of the Binet test compared with the curves based on McDougall's and Bobertag's experiments and also the Galtonian curve. A striking similarity is shown.

153. MCDONALD, A. *Bibliography of Exceptional Children and Their Education.* Washington: U. S. Bur. Educ. Bull. 32, 1913.

A valuable pamphlet. Some of the articles on the scale included in the references.

154. MCDONALD, J. B. *The Binet Tests in a Hospital for the Insane.* Traing. School, 1910, 7: 250-251.

The unity and interrelationship of mental phenomena demonstrated by the use of the method on dements.

155. MARTINDALE, W. C. *How Detroit Cares for Her Backward Children.* Psychol. Clinic. 1912, 6: 125-130.

The Binet scale used for diagnostic purposes.

156. MEUMANN, E. *Intelligenzprüfungen an Kindern der Volksschule.* Exper. Pädog. 1905, 1: 35-101.

An excellent outline of the development up to 1905 of tests for intelligence.

157. MEUMANN, E. *Der gegenwärtige Stand der Methodik der Intelligenzprüfungen (mit besonderer Rücksicht auf die Kinderpsychologie).* Zsch. f. exper. Päd. 1910, 11: 68-79.

A discussion of tests for (1) psychiatrist, (2) psychologist and (3) teacher. Each field requires its own characteristic system.

158. MEUMANN, E. *Experimentelle Pädagogik und Schulreform.* Zsch. f. Päd. Psychol., 1911, 12: 1-13.

The problem of measuring intelligence is very important for experimental pedagogy.

159. MEUMANN, E. *Uber eine neue Methode der Intelligenzprüfung und über den Wert der Kombinations methoden.* Zsch. f. päd. Psychol. 1912, 13: 145-163. Also 1. deut. Kongr. f. Jugendbldg. u. Jugendknde. Dresden, 1911.

A series of words varying in number and in degree of relation are used in constructing a sentence or a story. The types or response are different, depending on individual mental ability.

160. MEUMANN, E. *Anleitung zu praktischen Arbeiten in der Jugendkunde und experimentellen Pädogogik.* Zsch. f. päd. Psychol. 1912, 13: 623-638.

A short history of the scale and a review of the criticisms.

161. MEUMANN, E. *Sammelreferat über die Literatur der Jugendkunde.* Archiv. f. d. ges. Psychol. 1912, 25: (Literaturbericht) 85-164.

(See note to Vorlesungen.)

162. MEUMANN, E. *Vorlesungen.* Leipzig: Engelmann, 1913. Zehnte Vorlesung, pp. 94-299.

An excellent summary and criticism of all that has so far been done along the line of tests for measuring intelligence.

163. MEUMANN, E. *Die soziale Bedeutung der Intelligenzprüfungen.* Zsch. f. päd. Psychol., 1913, 14: 433-440.

Results seem to show that children of well-to-do parents test higher than the children of poorer parents. We need a new series which will measure native capacity.

164. ———— *Modo de aplicar la escala métrica de Binet.* Rev. de educacion. 1911, 1: 43-54.

165. MONROE, W. S. *The Intelligence of Six Hundred Young Children.* 21. Ann. Meetg. Amer. Psychol. Assn. Cleveland, O., 1912-1913.

The results obtained from color test compared with those of the Binet test. The latter very accurate and sex differences less marked.

166. MORLÉ, M. *L'influence de l'état social sur le degré de l'intelligence des enfants.* Bull. Soc. libre Educ. psychol. de l'Enfant, 1911, 12: 8-15.

The Binet returns on poor children (40) are compared with those of children situated in better circumstances (40). He finds a difference in favor of the latter increasing with age. The tests were between the ages seven to ten.

167. MORROW, L., AND BRIDGMAN, O. *Delinquent Girls Tested by the Binet Scale.* Traing. School, 1912, 9: 33-36.

Forty out of sixty girls were found to be feeble-minded.

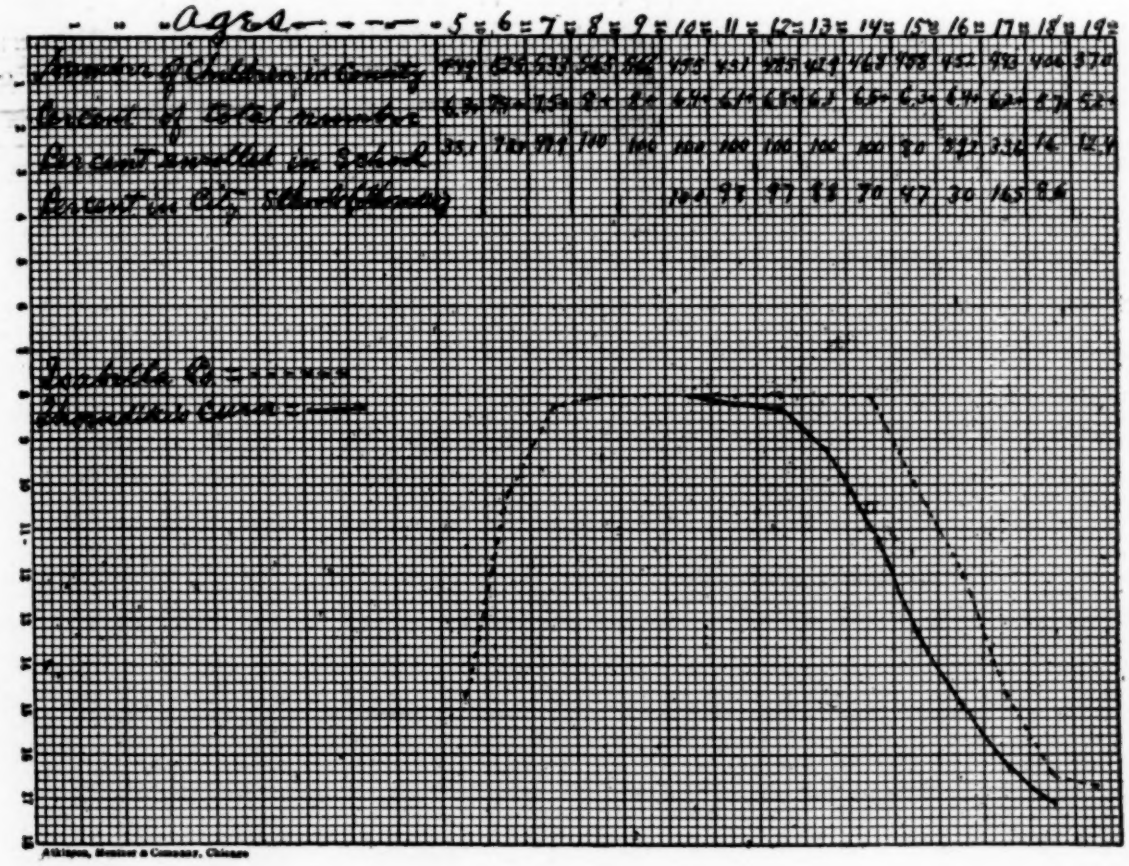
168. MORSE, J. *A Comparison of White and Colored Children Measured by the Binet Scale of Intelligence.* 8. Ann. Meetg. Southn. Soc. of Philos. and Psychol. Baltimore, Md. 1913. Also Pop. Sci. Mon., 1914, 84: 75-79. (See A. C. Strong.)

(Concluded in the June number.)

COMMUNICATIONS AND DISCUSSIONS.

THE ELIMINATION OF PUPILS FROM SCHOOL IN A RURAL COUNTY.

The publication of Thorndike's study of elimination in cities of 25,000 inhabitants or more made possible, for the first time, a comparison between school attendance in cities and rural communities. Accurate data for such a comparison have been difficult to secure from the smaller towns and rural schools. The opinion has been quite common that the elimination of pupils from school in small communities has been more rapid, at least after certain grades were reached, than in the cities. To test this assumption, the writer, with the aid of some of his students, secured the data for the construction of the elimination curve for a representative rural county.


Ages
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Number of Children in County
Percent of total number
Percent enrolled in School
Percent in City Schools (Thorndike)
Symbols C = - - - - -
Theoretical curve = ——
Atkinson, Mentzer & Company, Chicago

Isabella county, located in the center of the lower peninsula of Michigan, is a prosperous rural county of about 23,000 inhabitants. The population is fairly homogeneous. The early settlers, for the most part, came from New York and other Eastern States. The "foreign" population is made up of Irish and German immigrants of a generation ago and their descendants. Practically no immigrants have come into the county during the past decade. The largest town in the county has a population of approximately 5000. The county is therefore characteristically rural.

There are 111 public schools in the county, of which 104 are one-room schools, 3 two-room schools, 2 four-room schools and 2 high schools, besides 2 parochial schools, one of which offers a high-school course.

The school census of 1912 shows that there were in the county 7035 persons of school age from 5 to 19 years of age, inclusive. The table shows the distribution of these children by ages and the per cent. of each age enrolled in school during the school year of 1912-13. The per cent. of each age retained in school in the cities, according to Thorndike, is also given. The curves based upon these per cents explain themselves, and show clearly that for the ages 10 to 18 more pupils are retained in the rural than in the city schools. Enrollment in these rural schools is maintained at 100 per cent. for the ages 8 to 14, inclusive.

E. C. Rowe.

Central State Normal School,
Mt. Pleasant, Mich.

THE
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EDITORIAL.

SCHOOL INVESTIGATIONS IN NEW YORK CITY.

It would seem that the Hanus School Inquiry Commission was only the first fruit of the harvest of investigations in New York City. Not only is there to be an investigation of the training of elementary school teachers, which will take account of admission to the training school, the work in the training school and the appointment of graduates to permanent positions in the schools, but sundry other investigations are likewise in progress. One of these has to do with teachers' salaries. Although the equal-pay law, passed four years ago, materially improved the salaries of women teachers, there were some inequalities remaining which caused much dissatisfaction. As a result, many special salary bills passed the last Legislature, and, while these were all vetoed by the Mayor, there seemed to be sufficient ground for discontent to warrant a joint investigation of the whole salary situation by the Board of Estimate and the Board of Education. It is a noteworthy and hopeful sign that these two boards seem to be working together in complete harmony under the new administration.

A second type of investigation is that which pertains to the rating of teachers. It has been the custom to rate teachers in New York City as A, B+, or B. It is contended that these marks are arbitrary and represent different standards in the minds of different individuals, that they have a bad effect upon the teaching force, producing jealousy and discouragement, that they afford no opportunity for recognition of excellence in special lines, and that high ratings are given with two great frequency. It is proposed to rate teachers as satisfactory or unsatisfactory. If the rating is unsatisfactory, an explicit statement of the reasons shall be given. In addition to the mark satisfactory, special mention is to be made of teachers who have distinguished themselves in particular lines, and the nature of the distinction specified. In this way the ratings of the principal, if unsatisfactory, would become a constructive criticism of the teacher by which she could profit, and if distinction were reported, the superintendent would have a specific record of it, and would know in what line the distinction lay. Such a plan would inevitably lead to the preparation of a scoreboard and an approach to a more scientific evaluation of the worth of teachers. The investigation of this whole subject is a welcome indication, and will surely result in a more general understanding of what constitutes good teaching.

A third type of investigation deals with the duties and qualifications of school officers. Five important positions have been vacated in the New York City educational system this spring. They are: the presidency of the College of the City of New York, the principalship of the New York Training School for Teachers, an associate city superintendency, a district superintendency and the principalship of the High School of Commerce. In order that the Board of Education might be in a position to select the very best man or woman available for each of these positions, it instituted an inquiry through the division of reference and research as to the work which ought to be done by the holders of each of these positions, and as to the qualifications which each incumbent should possess. This would seem to be the scientific way of setting about the selection of the proper persons for such responsible positions, and it is devoutly to be hoped that the board may be guided by the recommendations.

In all of these investigations we find healthy signs of intelligence, and we believe that they indicate a tendency to a better and more efficient conduct of the schools. J. C. B.

NOTES AND NEWS.

Under the auspices of the Extension Division of Indiana University a Conference on Educational Measurements was held at Bloomington, April 17 and 18. The chief speaker was Professor E. L. Thorndike of Teachers College, Columbia University, who delivered an address at each of the five sessions. The titles of his addresses will give some idea of the character of the conference. They were: "Means of Increasing Efficiency in Arithmetic"; "Demonstration: Giving of Tests in Reading"; "Round Table: Tests of Oral and Silent Reading"; "Individual Differences and Their Causes"; "Units and Scales for Measuring Educational Products"; "Round Table: The Use of the New Educational Scales in Ordinary School Practice." Other addresses were: "Results of Binet Tests," by E. E. Jones; "Organization of School Surveys in Towns and Small Cities," by H. L. Smith; "Results of Two Statistical Studies Connected with High School Supervision," by E. E. Ramsay; "Use of Courtis Tests in Central School Building," by Mary Kerr; "Elementary Teachers and Co-operative Research," by M. E. Haggerty, and "Round Table: What the University Can Do for the Elementary and Secondary Schools of Indiana," led by W. F. Book.

During the past winter semester (1913-1914) the Institute J. J. Rousseau, Geneva, increased its number of regularly-enrolled students from 30 of the preceding semester to 43. Besides the regular courses of study, two subjects were particularly treated by a series of specialists, viz.: *Religious Education,* lectures given by representatives of Judaism, the Greek Orthodox Church, Roman Catholicism, Protestantism, and secular moral culture; also a series of lectures, some of them by medical specialists, on *Sexual Education.*

The Institute J. J. Rousseau has organized on its premises a "Children's House," the inspiration of which comes chiefly from the principles of Mme. Montessori.

The Institute has also published two sets of *Educative Games,* compiled by Mlle. Descoeudres after the principles of Dr. Decroly. These sets are especially for young and backward children. (Set for young children, 30 Fr.; set for older children, 20 Fr.). The Institute is also about to manufacture the *scale* and apparatus designed by Dr. P. Godin for his system of measurement of growth of children (price 50 Fr.). Apply to the Director of the Institute J. J. Rosseau, Prof. Pierre Bovet, 5, Place Taconnerie, Geneva.

The new Division of Reference and Research of New York City has recently made a voluminous report to the Board of Education,

outlining a thorough study of the training schools. The inquiry will include a study of the preparation, examination and supervision of elementary school teachers, and will be participated in by the superintendent, examiners, principals and teachers, as well as instructors in outside institutions for the preparation of teachers. It will be remembered that the Hanus Commission expressed great regret at being unable to extend its investigations to the training of teachers. It is thought that the present inquiry will be one of he most significant and far-reaching that has ever been made of a school system.

Professor D. A. Anderson of the School of Education, University of Washington, Seattle, is circulating a questionary upon "Teachers' Improvement During Service." The object is to ascertain what is the prevailing practice and what the leading schoolmen of the country believe should be the practice. The topics dealt with include prerequisites to securing positions, amount of work performed in teaching, teachers' meetings, outside study and promotions.

In order to obtain national standards for the four fundamental operations in arithmetic, the Department of Co-operative Research of the Courtis Standard Tests invites superintendents, principals and educational investigators to participate in a nation-wide measurement of arithmetical abilities of pupils of all grades from the third through the high school at some time during the last four weeks before the summer vacation. The tests used will be the new Series B tests, just issued this year. This is a worthy undertaking, and deserves support both from the standpoint of educational research and from that of the practical value to the schools tested. Further information may be secured by applying to Courtis Standard Tests, 82 Eliot street, Detroit, Mich.

The George Peabody College for Teachers will open its doors to students for the summer session, June 25 to August 4. Since the old Peabody Normal School closed in June, 1911, the authorities have increased the assets of the institution to nearly three and a quarter million dollars, have erected new buildings, provided new equipment and secured for the teaching staff a strong corps of instructors. For the summer session the regular staff will be augmented by eminent instructors from other institutions, and the entire plant of Vanderbilt University and of Ward-Belmont College will be placed at the disposal of the College for Teachers.

The Lapeer Training School for Teachers, established in connection with the Michigan Home for Feeble-Minded and Epileptic at Lapeer, Mich., will hold its first annual session next summer, beginning July 6 and closing August 14. The purpose of the school is to prepare teachers for the training and instruction of backward and feeble-minded children, and to develop a more general interest throughout the State in the education of exceptional children of all types. The officers of instruction are: H. A. Haynes, M.D., Director of the Summer School (Medical Superintendent, Michigan Home for Feeble-Minded and Epileptic); Charles Scott Berry, Ph.D., Psychologist (Assistant Professor of Education, University of Michigan); Mrs. Evelyn R. Lyons, Graduate of State Norman School, Oneonta, N. Y., Principal of Demonstration School (Supervisor and Teacher of Special Class, Rochester, N. Y.). Mrs. Lyons will be assisted in the Demonstration School by five other teachers.

According to the daily press, Professor R. W. Husband of Dartmouth College has collected some statistics which would tend to refute the general belief that those students who rank high in their studies are not generally interested in outside activities. The group of Dartmouth students who had been put on probation for poor work in their studies was compared with an equal number of students who had attained a rank of at least 75 per cent. The activities of high rank men are more representative of the total activities of the college than those of low rank men. The latter confine themselves chiefly to athletics of the more vigorous kind.

Princeton is trying a new plan to keep freshmen students up to standard in their work. Tests in all subjects are held at stated intervals, the results are combined with the records of daily recitations, and reports are made to the registrar. Any freshman whose work is unsatisfactory in eight or more hours is placed on probation, and is thereby excluded from participating in all forms of extra-curriculum activities. He is reinstated only when a subsequent report shows that he has re-established a satisfactory standing in current work. It he persistently neglects his work, he may be dismissed from the university.

The department of education of Harvard University plans to establish a model school next fall, to be used as a demonstration school for its students. The school is to begin as a kindergarten, and a

new grade will be added each year until the curriculum provides a complete education up to college entrance. It will not be used as a practice school by students of the department, but will have the best teachers that can be secured, and will seek the co-operation of parents in securing the most favorable conditions for work.

Readers of the JOURNAL OF EDUCATIONAL PSYCHOLOGY will be interested in the new *Zentralblatt für Psychologie und psychologische Pädagogik,* the first number of which has recently been received. The *Zentralblatt,* which is edited by Dr. Wilhelm Peters, University of Würzburg, and published by Curt Kabitzsch, Würzburg, will contain no original investigations, but will confine itself strictly to abstracts and reviews. It aims to cover the whole field of psychology, both pure and applied, and will give especial attention to investigations in experimental education. There is undoubtedly a distinct need for a journal of this type. The periodicals in special fields of psychology are increasing so rapidly, and the books and monographs are pouring from the press in such quantities, that it is exceedingly difficult to keep abreast with all the literature. Most of the reviews in the journals conducted for that purpose are from one to three years behind the date of publication. The *Zentralblatt* will be issued 10 times a year, and proposes to give its readers a bird's-eye view of all the recent publications in any part of the psychological field. The first number contains 100 reviews, and the reader is impressed with their timeliness, their brevity and the thoroughness with which the field is covered. The subscription price is eight marks per year, which may be sent directly to the publisher, Curt Kabitzsch, Würzburg, Germany.

Another recently-established journal which will be of interest to educational psychologists is the *Revue de Pédotechnie,* which is issued by the *Societe Belge de Pédotechnie* with the collaboration of the *Institut J. J. Rousseau* of Geneva. The chairman of the editorial committee is Dr. Decroly, and the subscription, 7 fr.50, may be sent to Mlle. A. Poelemans, 95 Avenue de l'Hippodrome, Ixelles, Belgium. The *Revue de Pédotechnie* takes as its task the search for practical applications of the science of paidology. The *Revue* presents an interesting program, to which we shall return in a subsequent issue.

The Psychological Bulletin announces in a recent number that,

owing to the large amount of experimental material submitted to the *Psychological Review,* for which that journal has no space available, an effort will be made to establish a *Journal of Experimental Psychology* next fall under the editorship of Professor John B. Watson.

If the establishment of new journals is any index, psychology is in a very flourishing condition. The following new journals are announced:

Archiv für Religionspsychologie. Edited by W. Stählin; published by J. C. B. Mohr (Paul Siebeck), Tübingen. Subscription, 12 marks.

Münchener Studien zur Psychologie und Philosophie. Edited by Oswald Külpe and Karl Bühler; published by W. Spemann, Stuttgart. Each number sold singly.

Archiv für Frauenkunde und Eugenik. Edited by Max Hirsch; published by Curt Kabitzsch, Würzburg. Subscription, 16 marks per volume.

Zeitschrift für Sexualwissenschaft. Edited by A. Eulenburg and J. Bloch.

David Camp Rogers, Ph.D., associate professor of psychology at the University of Kansas, has been appointed professor of psychology at Smith College.—*Science.*

Frederic E. Farrington, associate professor of educational administration, Teachers College, Columbia University, has accepted the position of professor of education at Yale University, formerly held by Professor E. C. Moore of Harvard. Professor Farrington has stated that he will lecture at both Yale and Columbia until July, 1915.

Mr. D. K. Fraser, M.A. (Edinburgh), formerly assistant to Professor Meumann at Hamburg, who has been doing graduate work at Cornell University during the past year, has been elected assistant professor of education at that institution, where he will take charge of the courses in the history and principles of education. Professor DeGarmo, who now retires from the professorship of education, will make his headquarters at Miami, Fla., where he proposes to continue work upon the problems of esthetic education.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

MEYER BLOOMFIELD. *The School and the Start in Life. A Study of the Relation Between School and Employment in England, Scotland and Germany.* Bulletin 595. Washington: Bureau of Education, 1914. Pp. 143.

An admirable statement of the work that is being done in Liverpool, London, Birmingham, Glasgow, Edinburgh, and in various German cities to familiarize school pupils with their opportunities for profitable and desirable employment when they leave school, and to prevent misfits and the resulting social and economic loss. There is a valuable bibliography of British and German literature on the subject.

JAMES C. BOYKIN AND WILLIAM R. HOOD. *Legislation and Judicial Decisions Relating to Education.* Bulletin 566. Washington: Bureau of Education, 1913. Pp. 304.

A mass of well-digested and indexed legal information concerning educational matters in the different States from 1909 to 1912.

JOSEPH C. BROWN AND LOTUS D. COFFMAN. *How to Teach Arithmetic.* Chicago: Row, Peterson & Co., 1914. Pp. viii, 373.

This book is intended as a manual for teachers and a textbook for normal schools. Part I sketches the history of arithmetic and gives a clear outline of the experimental studies of Rice, Stone, Courtis, Bonser and others on the determination of arithmetical abilities. Part II contains general suggestions on the methods of teaching arithmetic, and Part III deals with the specific topics to be taken up in class. The book is written from a thoroughly modern point of view, and should prove very helpful to those teachers who are trying to vitalize the work in arithmetic.

ROSE A. CARRIGAN. *Scientific Measurements of Arithmetical Abilities in Boston Public Schools.* City of Boston: Printing Department, January, 1914. Pp. 13.

Statistical tables setting forth the results of the application of the new Courtis Standard Tests in Arithmetic, Series B, to selected groups of children in the Boston schools. The tables are important, in that they furnish the first norms of performance in the new series of tests.

IDA COE AND ALICE J. CHRISTIE. *Story Hour Readers. Book Two.* Cincinnati: American Book Co., 1914. Pp. 204.

The splendid illustrations in this book will be a great attraction to children, and will lure them on to try to discover the story for themselves and to interpret it to others.

JOHN GAYLORD COULTER. *Aim and Method in High School Science. Notes on Organization and Content. Relations of Science to Conduct.* The School Science Series, No. 1, Bloomington, Ill. Pp. 24. 10 cents.

An admirable collection of papers on high-school science. The author urges a rational organization of science work in the high school and more emphasis upon the scientific method and attitude of mind than upon profusion of data. He favors an introductory course in "general science," which will appeal to the interests of all the youth and will be frankly inspirational rather than mathematical.

JOHN GAYLORD COULTER. *Plant Life and Plant Uses.* Cincinnati: The American Book Co., 1913. Pp. xvi, 464.

"The effort is to include what has the proper place in the education of *all* young people, and to exclude special information which properly has required place only in the education of *some* young people. * * * The manner of the book has been determined by a desire to make what is important seem interesting to young readers." The author has succeeded admirably in his task.

WALTER F. DEARBORN. *Formen des Infantilismus mit Berücksichtigung ihrer klinischen Unterscheidung.* Jena: Gustav Fischer, 1913. Pp. 107.

On the basis of extended study of individual cases, the author distinguishes four types of infantilism: Dysthyroidism, or arrested physical and mental development due to some defect of the thyroid; dysgenitalism, in which there is a tendency to giantism, but the sex organs are undeveloped and the emotional life is childish; dystrophic infantilism, or miniature adults, and mongolism, which probably goes back to defective embryonal development.

O. DECROLY. *Epreuve nouvelle pour l'examen mental et son application aux enfants anormaux.* Extrait du Bull. de la Soc. d'Anthropologie de Bruxelles. Vol. 32, December, 1913. Pp. 25.

An attempt to devise a series of tests which will be free from the charge urged against the Binet tests of laying too great emphasis

on the use of words. Sets of pictures representing a story are placed before the child, and the task is to arrange them in logical order. The time and the quality of the result are recorded. The results obtained lead the author to consider the test a promising one.

O. DECROLY. *Les classes homogènes et l'examen mental par la Méthode des tests de Binet et Simon.* Pp. 14.

Statement of the general principles involved in the mental examination of children, with special reference to the Binet tests. Binet never intended to exclude subsidiary physical, mental and pedagogical tests of the individual child's capacities. Some things needed to improve the scale are: less stress on tests implying language, modification of tests that depend too much on environment, insertion of tests of certain important functions at several different years, insertion of tests of practical intelligence, endurance, more use of speed as a diagnostic factor, further study of the method of computing and recording ages, and, if possible, tests of the "moral sense."

HAROLD W. FOGHT. *The Educational System of Rural Denmark.* Bulletin 569. Washington: Bureau of Education, 1914. Pp. 46.

Presents interesting features of country life in a land where rural conditions have received most careful attention from teachers and educational authorities.

L. L. FRIEND. *The Folk High Schools of Denmark.* Bulletin 576. Washington: Bureau of Education, 1914. Pp. 24.

These schools have been of great importance in the intellectual and economic development of Denmark, and present many features that might advantageously be adapted to this country.

W. H. HECK. *Parents' Part in School Hygiene.* Reprinted from the Educational Review, February, 1914. Pp. 127-133.

Teachers and superintendents should endeavor to make clear to parents what they are trying to do in inculcating ideals and habits of healthful living at school, and should make systematic efforts to secure their co-operation.

I. L. KANDEL. *Elementary Education in England, with Special Reference to London, Liverpool and Manchester.* Bulletin 568. Washington: Bureau of Education, 1914. Pp. 161.

An interesting account of a significant movement in English education.

Kindergartens in the United States. Statistics and Present Problems. Bulletin 577. Washington: Bureau of Education, 1914. Pp. 133.

The Bulletin presents statistics of public kindergartens, statistics of kindergartens other than public, kindergartens as viewed by superintendents, primary supervisors and first-grade teachers, and abstracts of papers read at the Washington meeting of the International Kindergarten Union, April-May, 1913.

London County Council. Report of the Proceedings at the Annual Conference of Teachers, 1914. London: P. S. King & Son, 1914. Pp. 68. 1s.9d.

Sessions were devoted to the consideration of the teaching of history, the prefect system, fatigue, memory drawing and educational experiments in schools. The papers on fatigue included "Evidences of Mental Fatigue in Adolescent Pupils in Evening Schools," by W. H. Winch; "Recent Researches on the Subject of Fatigue," by T. H. Pear; "The Attitude of the Teacher in Regard to Problems of Fatigue," by R. R. Rusk. The most interesting of the educational experiments reported was that of Dr. J. E. Borland on "Experiments with Children in Memorizing Musical Pitch." Dr. Borland presented evidence to show that with a little training most school children can memorize a given pitch, say, middle C, accurately enough to produce the tone on demand. He seems, however, to confuse terms when he speaks of this capacity as absolute pitch memory. Teachers of drawing will be interested in the discussion of the value of drawing from memory.

HUGO MUENSTERBURG. *Grundzüge der Psychotechnik.* Leipzig: J. A. Barth, 1914. Pp. xii, 767. M. 16. Geb. M. 17.

This massive volume represents only a fragment of a more ambitious plan. Twelve years ago, when the author's *Grundzüge der Psychologie, Band I. Prinzipien der Psychologie* appeared, it was intended that that volume should serve as a general introduction to a systematic treatment of the whole field of psychology in six volumes, and that the present volume should be the last. Volume II was to deal with casual individual psychology, Volume III with casual social psychology, Volume IV with teleological psychology and Volume V with applied psychology as seen in the development of civilization. The other volumes are still in preparation. The present work is the outgrowth of the author's lectures on applied psychology as exchange professor at the University of Berlin. Its purpose is to furnish an adequate theoretical groundwork to the various technical applications of psychology, to organize these fragmentary investigations into a unified body of science and to point

out new paths of endeavor and stimulate to increased activity in these lines. The general discussion (190 pages) treats of the task of psychotechnics, psychological forecasting and the lines along which psychological influence may be exerted. The second part deals with the specific branches of psychotechnics, and includes social relationships, health, industry, law and order, education, art and science. The field thus opened up is one of great possibilities and of fascinating interest, and it may be safely predicted that the present work will set the standard in it for many years to come.

CLARENCE ARTHUR PERRY. *A Form for Reporting the Evening Use of Public School Buildings.* Washington: Bureau of Education, 1914. Pp. 9.

There is a growing sentiment that public-school plants should be utilized more extensively than they have been, and the present form will not only give more accurate information as to the amount and nature of such utilization, but will also tend to stimulate school authorities to use their plants in a more varied and effective manner.

W. PETERS UND O. NEMECEK. *Massenversuche über Erinnerungsassoziationen.* Reprinted from Fortschritte der Psychologie und ihrer Anwendungen, Bd. II, No. 4, January, 1914. Pp. 226-245.

The authors tested 118 pupils of the Vienna Commercial Academy, ranging in age from 14 to 24 (mode, 17). They used a series of 105 stimulus words, and as each word was pronounced the pupils recalled some experience and wrote it down, indicating whether the experience was pleasurable or painful, and whether the memory was pleasurable or painful. The experiences recalled were more frequently emotional than indifferent, and of the emotional experiences the pleasurable outweighed the painful. With younger children the same was true to a less degree.

MORTON PRINCE. *The Unconscious. The Fundamentals of Human Behavior, Normal and Abnormal.* New York: The Macmillan Company, 1914. Pp. xiii, 549. $2 net.

This is the systematic work on the nature of the subconscious that the psychological world has been expecting from Dr. Prince ever since the appearance of *"The Dissociation of a Personality,"* eight years ago. The fundamental theses of the book are that "mind" includes more than conscious processes—"that it includes a vast storehouse of acquired dispositions deposited by the experiences of life, and that these dispositions may be regarded as chemical or physical in their nature, as sort of residua deposited by the neural processes correlated with the conscious experiences of life." These dispositions provide the material for conscious memory and other conscious processes, and until they thus function are subconscious.

They may, however, function without being accompanied by conscious equivalents at all—and in this case they are unconscious. Another type of the subconscious is found where these dispositions function with accompaniments that are conscious but do not enter the focus of clear consciousness. This condition is called coconsciousness, and is co-ordinated with the unconscious, the two forming subdivisions of the subconscious. This identification of consciousness, even in its negative form of unconsciousness, with neural dispositions will be anathema to some, but whether we adopt the author's terminology or not, many of the phenomena cited can be explained only by reference to changes in the nervous system.

WILLIAM STERN. *The Physiological Methods of Testing Intelligence.* Translated from the German by Guy Montrose Whipple. Educational Psychology Monographs, No. 13. Baltimore: Warwick & York, Inc., 1914. Pp. x, 160. $1.25.

No phase of educational psychology has aroused greater interest in the past two or three years than that of tests of intelligence. Not only the psychological specialists, but superintendents, teachers and educationists generally have evinced the keenest appreciation of the significance of such tests, and have contributed in various ways to their popularization. Over 250 books and articles have been published which deal in more or less detailed fashion with the Binet tests alone. It will be a boon to English readers, therefore, to have access to Stern's monograph, which is the most complete and thoroughgoing discussion of tests of intelligence in existence, with the possible exception of Meumann's Vorlesungen. The author first takes up the nature and problem of intelligence testing, then discusses single tests and series of tests, and devotes the body of the monograph (80 pages) to the method of age-gradation (Binet-Simon method). The author brings together the results of all the more important investigations in which the Binet scale has been used, and subjects them to a critical examination, indicating lines along which the tests may be reorganized and improved. The last section is devoted to estimating and testing finer gradations of intelligence by the method of ranks, in which the author opens up a field of practical investigation in the schoolroom which promises to be very fruitful.

WILLIAM KNOX TATE. *Some Suggestive Features of the Swiss School System.* Bulletin 567. Washington: Bureau of Education, 1914. Pp. 119.

The features that receive special emphasis in this monograph are the educational ideals of the Swiss people, the spirit of the classroom, a general survey of the Swiss school system, the teacher and the teaching profession, school buildings and equipment, and the Swiss

scheme for vocational education. A feature of the monograph is the profusion of photographs and plans of school buildings.

LEWIS M. TERMAN. *The Hygiene of the School Child.* Boston: Houghton-Mifflin Company, 1914. Pp. xvii, 417. $1.65 net.

It must be admitted that the study of school hygiene in America has lagged behind that in leading European countries. It is true that we have several textbooks on the subject, but they are all elementary, and in their effort to cover the whole field the authors have spread their work out so that the treatment of any given phase of the subject is extremely superficial. The author of the present book is to be congratulated on limiting himself to a specific aspect of school hygiene, that of the school child, and on giving this a relatively thorough and intensive treatment. The first six chapters deal with the general phenomena of growth, anatomical and physiological age and the hygiene of growth. Chapters eight, nine and ten discuss malnutrition, tuberculosis and the physiology of ventilation. The next five chapters develop the hygiene of the teeth, nose, throat, ear and eye, and consider the causes and the prevention of headaches in school children. The remaining chapters are devoted to various aspects of mental hygiene, to speech defects and to the sleep of school children. The present book is to be followed by one on the Hygiene of Instruction.

GUY MONTROSE WHIPPLE. *Manual of Mental and Physical Tests. Part I. Simpler Processes.* (Second edition, revised and enlarged.) Baltimore: Warwick & York, Inc., 1914. Pp. xvi, 365. $2.25.

It is an indication of the keen interest in mental tests and of the need for a single work which shall collect and organize the widely-scattered data that the first edition of the *Manual,* which was thought to be sufficient for at least 10 years, was exhausted in three years. The second edition had to be materially expanded, in order to take account of the rapidly-increasing number of investigations, and it was, therefore, thought best to issue the new *Manual* in two volumes. Volume I deals with the simpler processes, Volume II with the more complex processes. The chapter headings and the numbering of the tests remain the same as in the first edition, but every chapter, and almost every page, give evidence of a careful, thoroughgoing revision. The most recent literature has everywhere received thoughtful consideration, and the number of references at the end of each chapter has been greatly augmented. There are many new illustrations, charts and tables, and two new tests, the spot-pattern test and the form-board test, have been introduced. In its new form the *Manual* will undoubtedly continue to enjoy the favor it has gained as the best book of the kind in any language.